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Appendices for the Final Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan

Coconino, Yavapai, and Mojave Counties, Arizona

Cover: collage of four images—Kanab Wilderness, Abert squirrel, Ponderosa pine, and aspen.

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Changes have been made to this document in response to the appeal resolution instructions provided by the Forest Service Chief's Reviewing Officer following administrative review of two appeals. These changes to the Final Environmental Impact Statement and Appendices were made to clarify the relationship between grazing capability and suitability (page 473, 474), better explain the role of allotment management plans and annual operating instructions in making adjustments to livestock grazing using the adaptive management framework (pages 358, 363, 396), and that in addition to rulemaking procedures other legal mechanisms, could be used to limit the use of lead ammunition if deemed necessary or appropriate(pages 379, 380, 381). The adjusted pages are clearly marked as "(Corrected 05/2015)".

Appendix A. Response to Comments

This appendix documents the Kaibab National Forest (NF) responses to substantive comments that were received during the 90-day comment period for the Draft Land and Resources Management Plan (plan or forest plan) and Environmental Impact Statement (EIS). A notice of availability was posted in the Federal Register on April 20, 2012, by the Environmental Protection Agency (EPA) for the "Draft Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan" (DEIS). This initiated the comment period, which ended on July 18, 2012. The Forest Service received comment letters or emails from 56 individuals, organizations, and agencies; these comments were received by email, in person and via the U.S. Post Office. Letters from government agencies and tribes are included in appendix N. The original comments received on the DEIS are included in the administrative project record, which is available at the Kaibab Forest Supervisors office, 800 s. 6th Street, Williams Arizona 86046.

Content Analysis Process

The comment content analysis followed a systematic process of reading, coding, and summarizing the comments that were submitted. This process ensured that every comment was read, analyzed, and considered. The comments that were most helpful were those that were unique and specifically related to the plan and analysis in the DEIS. Each commenter was assigned a commenter code (see list of commenter codes on the last page of this appendix). Each unique comment was numbered sequentially and paraphrased where necessary to focus on issues. Comments were then sorted by topic in a spreadsheet and exported into this appendix. Similar comments were grouped and nearly identical comments were combined. The interdisciplinary team prepared responses for each comment based on its merits, regardless of the source or whether expressed by many or by one. This appendix documents the Kaibab NF responses to substantive comments, which are addressed as prescribed in 40 CFR 1503.4 in the following ways:

Modifying the proposed plan (alternative B) and alternatives;

Developing or analyzing alternatives not given detailed consideration in the DEIS;

Supplementing, improving, or modifying the analysis that the DEIS documented;

Making factual corrections; and/or

Explaining why the comments need no further agency response.

Alternatives

Comment: The forest should have prepared a more creative and comprehensive set of alternatives. (EBR-1) The Forest Service has failed to provide for a full range of reasonable alternatives as the desired conditions are the same for all alternatives. (SC-80)

Response: *The EIS evaluates a range of reasonable alternatives that were developed to address the significant issues raised. The final environmental impact statement (FEIS) chapter 1 describes the issues raised, and chapter 2 describes the alternatives developed in response to the significant issues. The desired conditions did not vary as they describe a collaboratively developed common vision. Alternatives were developed as different means to achieve those desired conditions. The issues that drove alternatives C and D resulted in modifications of the proposed action to include different guidelines, a new management area with a corresponding desired condition, additional recommended wilderness, and either reduced or no acres identified as suitable timber. Most of*

the comments received about the desired conditions were addressed by modifying the associated desired condition language. Examples include adding language to ponderosa pine and dry mixed conifer desired conditions that "group sizes may be larger," to cottonwood-willow that "native vegetation dominates," and that "Soils are free from anthropogenic contaminants that could alter ecosystem integrity or affect public health."

Comment: There should be an alternative based on the existing standards and guidelines in the existing forest plan. (CBD-13)

Response: *Alternative A-no action is the alternative containing the standards and guidelines in the existing plan.*

Comment: The Forest Service should consider and fully analyze an action alternative that responds to changes in global and regional climate. There should be at least one reasonable alternative that provides increased protection to plant and animal species that responds to the scientific uncertainty regarding climate change impacts to habitat and water availability. (CBD-11, CBD-12)

Response: *The proposed action and alternatives were developed to address potential changes to the environment attributable to climatic change. The action alternatives respond to this issue to varying degrees by increasing plant community resilience and addressing uncertainties associated with climate change impacts to habitat and water availability. Climate change is addressed indirectly throughout the proposed plan with desired conditions in the form of functional ecosystems and resilient landscapes. Climate change is addressed directly in management approaches and monitoring plan implementation where appropriate. Plan appendix D provides a more detailed explanation of the strategy the Kaibab NF is using to address climate change.*

Comment: There should have been at least one alternative that maximizes the long-term vegetative health through a hands-off conservation strategy and restrictive management standards. (EBR-39)

Response*: Chapter 2 describes an alternative that uses a hands-off approach to vegetation management that was considered, but not analyzed in detail because it did not meet the purpose and need. Current conditions in the ponderosa pine and frequent-fire mixed conifer forests have accumulations of live and dead woody material that can lead to uncharacteristic and undesirable fire effects. With a "hands-off" approach, fire and other natural disturbances are the only available mechanisms for making progress toward desired conditions. Under current conditions, when natural ignitions occur, they typically either burn at low intensity and do not do enough to lift crowns, open up tree density, and reduce fuel accumulations; or they burn with high intensity, resulting in the loss of ecosystem diversity, structure, and processes. All of the action alternatives seek to provide for long-term vegetative health. Alternative D has no lands identified for timber production, which responds to the desire for a hands-off approach for maintaining the desired conditions after necessary mechanical treatments are implemented. Alternative D also has a more restrictive tree retention guideline, and additional recommended wilderness areas which would reduce both the intensity and extent of the mechanical treatments that are implemented.*

Comment: In addition to the recommended potential wilderness additions in alternatives C and D, we also urge the Kaibab National Forest to establish Red Point Inventoried Roadless Area (IRA) (7,136 acres) as a potential wilderness. (SC-111, WILD-29)

Response: *The Red Point IRA was assessed during the Potential Wilderness Evaluation and the rational for why it was not included in an alternative analyzed in detail was documented in the Potential Wilderness Evaluation report. In response to this comment and one received during scoping, an "alternative considered, but not analyzed in detail" was added to the FEIS. Chapter 2 now includes an alternative that contains the remaining two IRAs that were not previously addressed in the alternatives section. Red Point did not meet the criteria to be recommended for wilderness designation due to low capability scores for naturalness, special features and values, and manageability. The lower scores were in part due to extensive burning during the Warm Fire of 2006. As a result, the area has management needs to improve its progress toward the desired conditions that would be more difficult and expensive without mechanical means. As an inventoried roadless area, Red Point will continue to be managed for its roadless character and would likely be more capable of providing wilderness values in the future with fewer weeds and forest structure that better resembles the desired conditions. A description of the potential wilderness area analysis process and results for each area is found in the Kaibab National Forest Potential Wilderness Area Report.*

General Comments – Revised Plan/EIS

Comment: A historical synthesis including the administrative history of each forest district would benefit the Forest Service's long-term planning process to let future managers and the interested publics know about the historic individuals and the issues considered in each plan revision. (LS-13, WILD-4)

Response*: Historical information was used to: identify baseline conditions and trends in the Analysis of the Management Situation (AMS), provide context in the background and management approach sections of the plan, and inform the EIS existing conditions and cumulative effects analysis. As we implement the plan, we will continue to build upon, synthesize, and use historical information. While there would be benefits to compiling the suggested historic synthesis, it is beyond the scope of the plan revision process.*

Comment: The DEIS affected environment section should disclose important ecological, economic, and historic information, including how management under the old plan succeeded or failed. (EBR-22)

Response*: The management needs for change documented in the Analysis of the Management Situation/Comprehensive Evaluation Report (AMS/CER) identified conditions and trends that indicated a need for change in management under the old plan. These needs for change served as the focus for the proposed action development. The effects analysis documented in chapter 3 of the EIS discloses the effects and effectiveness of the no-action alternative, which is continued management under the 1988 plan, as amended.*

Comment: For a variety of reasons, the Kaibab NF has been unable to implement the current plan (alternative A). This situation is unsustainable and puts our public lands and future generations at risk. (JK-3)

Response: *The Kaibab NF has been implementing the original 1988 forest plan, as amended, over the last 15 plus years. Project proposals made during this time period were developed following plan guidance with the intent of moving the Kaibab NF toward plan-specified goals. Many of these proposals have been implemented or are in the process of being implemented. Achieving plan-specified goals for the Kaibab NF has not moved forward as rapidly as desired*

due to a variety of factors that have delayed project development and implementation. This has led to conflict and delays related to conflict resolution. The revised plan clarifies sections that have led to confusion over plan interpretation and provides direction for sustainable land management for future generations.

Comment: The plan should provide more clear direction to assist practitioners to navigate the plan. (AGFD-1) When references are made to other law, regulation or policy, they should more clearly describe how they would be implemented in the context of the plan. (DOI-18)

Response: *Chapter 1 of the draft plan contained guidance for navigating the plan and an explanation about the relationship of the plan to law, regulation, and policy. Portions of chapter 1 explained how to use the plan, but they were scattered throughout different sections where they were also a logical fit. For the final plan, a "Plan Implementation" header was added and the sections that addressed navigating, interpreting, and implementing the plan was consolidated. Additional information was added to chapter 1 to better clarify how to use the plan and how to apply the desired conditions at different scales. Chapter 1 of the plan has also been updated to clarify that the Kaibab NF is managed in accordance with law, regulation, and policy, but that the plan direction does not reiterate them. Certain laws, regulation, or policy are referenced in the management direction for specific resources. For example, plan guidelines for threatened, endangered, and sensitive species include "Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans." Therefore, in this case, the objectives and protection measures contained in current species recovery plans have the same force and effect as if they were duplicated in the plan. They are referenced and not duplicated verbatim to avoid having to revise the forest plan whenever a recovery plan is updated.*

Comment: Given the high spatial overlap of the Kaibab Plan and the 4FRI Project, we encourage the KNF to crosswalk its plan with that of 4FRI. (AGFD-55)

Response: *A crosswalk was done with the 4FRI for plan consistency, and the 4FRI proposed action is consistent with revised forest plan. Because 4FRI is a project implementing the plan, the crosswalk is in the 4FRI administrative record, not in the plan administrative record.*

Comment: Under Wilderness and Recommended Wilderness sections of the revised plan, we are concerned about the ability to adequately manage wildlife as habitat becomes more restricted and fragmented. Sometimes a more proactive approach to wildlife management is needed. The Department has experienced restrictions resulting from wilderness designation, including project delays and increased costs. If not properly implemented, additional wilderness designations could further inhibit the ability to perform necessary management activities. (AGFD-42)

Response: *The revised plan is based on restoration of the different vegetation groups to reflect historic conditions. Managing forest guided by historical conditions also restores the evolutionary environment, enhancing the capacity of organism's ecosystems to adapt to stressors (Reynolds et al. 2013) and should provide for the habitat components required by native species at the level in which they evolved with (Kalies et al. 2012; Kalies and Rosenstock 2013). The proposed restoration activities should help maintain and restore habitat that has been fragmented and would maintain wildlife habitat at historic levels in the long-term. The potential management needs were considered in the availability portion of the wilderness evaluation*

process. Site-specific information and input from stakeholders, including AGFD was used to evaluate the relative trade-offs of the wilderness recommendations.

Comment: Active forest restoration activities that reduce the risk of unnaturally severe fire are urgently needed in some existing wilderness areas. We encourage the plan to consider taking a strategic, experimental approach that allows for mechanical treatment of the heaviest fuel loads to achieve restoration objectives in wilderness. (AGFD-43)

Response: *The Wilderness Act prohibits the use of mechanized equipment in designated wilderness. The plan cannot make recommendations that are in conflict with the Wilderness Act. While the plan does not specifically address fuel reduction in wilderness, the Forest's Fire Management Plan does. It allows for the use of prescribed and wildfire to reduce unnatural accumulation of fuels.*

Comment: We think you should strike the word "breeding" from the Grand Canyon Game Preserve DC. This area is important for game animals in all seasons and especially for mule deer in the winter. (AGFD-45)

Response: *We agree. The word "breeding" has been removed.*

Comment: The proposed plan makes promises and targets to do various restoration work, as did the old plan, but few have been met. This should be acknowledged to show how empty these promises can be. (EBR-18)

Response: *Objectives and monitoring in the plan were developed to be realistic given budget, capacity, and weather constraints. There is acknowledgment in the introduction to chapter 3 of the EIS stating that the objectives were developed with the assumption that budgets would be similar to the last 5 years. If this is not the case, it is expected that actual accomplishments would be lower.*

Comment: Please explain how travel management, the 4FRI, and FSH relate to the plan. (RE-4)

Response: *The forest plan provides strategic guidance for project design and development that is consistent with the Forest Service Handbook and Manual direction that the Kaibab NF is already required to follow. Travel management and the Four Forest Restoration Initiative (4FRI) are large projects that implement plan direction and are to be consistent with the plan.*

Comment: Management for forest conditions for North Kaibab is needed to ensure compliance with potential designation of that district within the proposed Grand Canyon Headwaters National Monument. (LS-25)

Response*: Establishment of the proposed Grand Canyon Headwaters National Monument is not foreseeable, and therefore, not within the scope of the forest plan revision process. Should it become established, necessary compliance and adjustments to the forest plan would be completed at that time.*

Comment: Garland Prairie supports some of the highest fawn: doe ratios for pronghorn anywhere in the state of Arizona. We recommend the KNF include mention of this value in the

Management Area discussion, and specifically encourage a pronghorn-friendly boundary fence in the Objectives. (AGFD-48)

Response*: The statement "it is known to support some of the highest fawn to doe ratios for pronghorn anywhere in the state of Arizona" has been added to the management approach section. We did not develop objectives for this area because it would be redundant with the objectives in the revised plan which states "Modify fences and/or install crossings to facilitate pronghorn movement on 50 miles of fence within 10 years of plan approval" and the guideline "Pronghorn fence crossings should be installed along known movement corridors."*

Comment: The proposed plan and DEIS represent movement by Forest Service away from integrated resource management. (RE-3)

Response: *While the plan and EIS are organized resource-by-resource and use-by-use, the development of the plan and FEIS used an interdisciplinary process, considering input from a wide range of stakeholders and resource specialists with the intent of developing system-based interdisciplinary guidance to balance sustainability, use, and capacity. Where appropriate, the plan contains crosswalks to other relevant resource or use sections. The result is a plan and EIS that are better integrated, and easier to navigate than the previous plan.*

Comment: The EIS should establish criteria for active and passive restoration of forest vegetation accounting for the "future range of variability." (CBD-68)

Response: *The plan provides the desired conditions and objectives, but does not prescribe how criteria should be established or implementation should be accomplished. Those types of decisions are typically made at the project level.*

Comment: We request clarifying language to distinguish between the CWPP (which covers all of the Williams District (326,000 acres) and the WUI areas that buffer specific features. As it reads, there could be misinterpretation that the Desired Condition is to manage the entire CWPP toward the lower end of basal area. In addition, it would be helpful to estimate the acreage of WUI designation and to reiterate the size of buffers and feature types buffered by WUI treatments. (AGFD-47)

Response: *Within the WUI introduction it is already stated that: "For the purposes of this plan, the WUI area is refined to a buffer around WUI values to focus more intensive treatments where they will have the most impact for fire protection, and includes the following lands: Half-mile buffer around all private lands; Half-mile buffer around administrative sites, fee use cabins, fire lookouts, developed campgrounds, day use picnic areas, and facilities managed under special use permits; Half-mile buffer around at-risk communication sites".*

Comment: In the third bullet under the Kaibab Plateau Parkway desired conditions, we recommend adding "and to facilitate animal movement". (AGFD-46)

Response: *We agree and have added the recommended language.*

Standards and Guidelines

Comment: The National Forest Management Act (NFMA) regulations require the Forest Service to prepare a regional guide to provide each region to "provide standards and guides for addressing major issues and management concerns that need to be addressed at the regional level." (CBD-34)

Response: *There is no longer a regional guide for the Southwestern Region. This was withdrawn as required by the 2000 Planning Rule at 219.35(e).*

Comment: The proposed plan would repeal virtually all the standards and guidelines and replace them with nonbinding desired conditions and guidelines, which the Forest Service may disregard in project design and implementation at its discretion. (CBD-1)

Response*: To provide greater transparency about the disposition of each of the standards and guidelines from the current plan, we added a new appendix to the FEIS (appendix M) that shows how the key standards and guidelines from the original plan (as amended) compare with the final plan.*

We added a short section to chapter 1 of the revised plan that provides some background about plan development and explains the following:(1) many of the standards and guidelines that were "repealed" duplicated law, regulation, or policy, which the Kaibab NF is required to follow along with the forest plan direction; and (2) where appropriate, standards and guidelines were either retained or reframed in the form of desired conditions or objectives. Even with many of the standards and guidelines removed or reframed for these reasons, the revised plan still contains over 180 guidelines and 20 standards.

Chapter 1 of the revised plan explains that desired conditions and guidelines are not discretionary; projects must either maintain or move toward desired conditions. Guidelines are technical criteria or constraints that provide sideboards to keep projects and activities moving toward the desired conditions. A guideline only allows departure from its terms when the original intent of the guideline is met. When there is deviation from a guideline, the decision document must specify the deviation and the rationale for how the project meets its original intent. If it does not meet the original intent, a plan amendment is required.

Comment: Repealing environmental standards in the forest plan will result in reduced environmental standards at the site-specific level resulting in direct, indirect, and cumulative effects that should be disclosed in the EIS. (CBD-25) The EIS does not examine how management will change or acknowledge important differences between the proposed plan and the existing plan. (EBR-14) The EIS should include a discussion about how well the first forest plan worked. (RE-1)

Response: *The plan and the action alternatives provide for equal or increased environmental protection over that of the current plan through a combination of desired conditions, objectives, standards, and guidelines. We added appendix M to the FEIS that shows how the key standards and guidelines from the original plan (as amended) compare with the final plan. Many of the components were retained, some were modified, and some that were not within management control or that were already addressed by law, regulation, or policy were not carried forward. The AMS analyzed and disclosed the effectiveness of the current plan, and the FEIS evaluates and*

discloses the direct, indirect, and cumulative effects of all alternatives including alternative A (no action/current plan). Comparisons among alternatives are discussed throughout the FEIS.

Comment: The plan should not have discarded the water quality standards or standards for the Mexican spotted owl. (EBR-11)

Response: *The revised plan provides management direction for water quality in the Natural and Constructed Waters, Soils and Watershed, and Potable Water sections of the plan. The Mexican spotted owl is addressed in the plan section for threatened, endangered, and sensitive species. Some of the 1988 plan (as amended) standards for water quality and Mexican spotted owls were not retained because there is existing law, regulation, and policy guidance for these resources outside the plan that the Kaibab NF is already required to follow. The effects of the revised plan and the 1988 plan (as amended) on these resources are disclosed in the respective sections of the FEIS. In the revised plan, appendix B lists other law, policy, and regulation and appendix M shows how the key standards and guidelines from the original plan (as amended) compare with the final plan.*

Comment: The guidelines all contain the word "should" which does not afford any protection at all because the Forest Service can decline to follow them whenever the agency doesn't want to. If a project does not include such a measure, is it in violation of the plan? (EBR-8)

Response: *Plan language follows the Forest Service's technical guidance for writing guidelines, which specifies using the word "should." Guidelines are not discretionary. A guideline only allows for departure from its terms when the intent of the guideline is met. Deviation from a guideline must be specified in the decision document with the supporting rationale. When deviation from a guideline does not meet the original intent of the guideline, a plan amendment is required.*

Comment: The 1988 plan should have been used as a building block for the revised plan. For example, there was a standard that there should be 200 snags per acre, three age classes of woody riparian species along stream banks, and 90 percent shrub cover along stream banks. (EBR-2)

Response: *The original plan was used as a building block for the revised plan. Many of the original plan components were retained, some were modified, and some that were not within management control or that were already addressed by law, regulation, or policy were not carried forward. Point of correction: the original plan said there should be 200 snags per 100 acres, not per acre. When the plan was revised in 1996, the snag guidance in forest-wide directions for ponderosa pine habitat was modified to be two snags per acre.*

In the revised plan, the snag requirements were reframed as desired conditions at the mid-scale, and are very similar to the original 1988 plan and the original plan as amended, which is 1 to 2 snags per acre when averaged over 100 acres in ponderosa pine. The shrub and age classes in riparian areas were either not attainable due to upstream diversions off the Kaibab NF or not representative of the riparian systems that occur on the Kaibab NF. We added appendix M to the FEIS to show how the key standards and guidelines from the original plan (as amended) compare with the final plan.

Pinyon-juniper Communities

Comment: There should be language that allows for management of pinyon juniper communities toward a condition that may be considered outside of historic conditions (typically more open), and therefore, outside of the desired conditions as written. (AGFD-27)

Response*: The desired condition for canopy cover in the pinyon-juniper potential natural vegetation type (PNVT) now specifies "at the mid-scale." This additional language better reflects that variation is desirable, and that would likely have occurred under the natural disturbance regime. The language modification will better support management in pinyon-juniper that reduces tree density and creates fine-scale openings to improve wildlife habitat. The desired conditions for pinyon-juniper communities were developed to reflect the historic range of variation. The desired conditions include a mix of seral stages. The desire to manage for a somewhat balanced mix of seral stages on the landscape permits management for open conditions where appropriate, which would include some areas at the fine scale being more open (canopy cover less than the defined 10 percent).*

Comment: The desired condition for understory plant cover in pinyon-juniper communities and pinyon-juniper grasslands should also mention that they also support wildlife. (AGFD-2)

Response: *We responded to this comment by modifying these desired conditions (several places) to better represent the important habitat that pinyon-juniper communities provide for wildlife.*

Comment: The plan should include a guideline in pinyon-juniper communities that states "Vegetation treatments and livestock utilization levels should favor the development of understory diversity in areas where it has the potential to grow". (AGFD-4)

Response: *This suggestion was not incorporated because it would be redundant. The concern is already addressed through the vegetation desired conditions combined with the guidelines that state "Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow," "livestock management should favor the development of native cool season grasses and forbs," and "annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.)."*

Ponderosa Pine Forests

Comment: Reconstructed historic reference conditions should be used as general guides, rather than rigid restoration prescriptions. Restoration is not a single event, but a process that occurs over time. (SC-86)

Response: *Agreed. Plan components lay out the framework for restoration, rather than providing rigid prescriptions to restore specific reference conditions in specific locations. The revised plan was developed to leave room for specifics to be determined on a site-specific basis using a variety of information sources, including but not limited to reference conditions. Often a single project can only make progress toward, but not fully achieve the desired conditions. Follow-up activities are often needed to achieve and maintain desired conditions over time.*

Comment: A process-centered approach emphasizing the use of naturally adapted fire disturbance should be used rather than a structural approach that tries to replicate the spatial patterns of old growth that may have existed at a particular point in history. (CBD-41)

Response: *Structure and function of old growth are not independent of one another and both are addressed in the plan. Desired conditions for the vegetation types that restoration objectives were developed for specify both structural and process-based components articulating the desired fire regime and other aspects of ecosystem function. The management approach for ponderosa pine and frequent-fire mixed conifer forests specifies that "fire-only treatments may be appropriate for some areas with open canopies and low fuel loads, but mechanical fuel reduction is needed in many areas before fire can be safely reintroduced." This recognizes that under current conditions, a process-centered approach may result in the loss of critical ecosystem components that would have been resilient under historic conditions as well as the dynamic nature of uneven-aged forest ecosystems where old-growth habitat may shift on the landscape over time.*

Comment: Desired vegetation structure and composition patterns based solely on the historic ranges of variability may not be appropriate. Desired conditions concepts should be updated to a "future range of variability" that accounts for inevitable climate change. The EIS should assess departure from the fire regime from more than just one narrowly defined historic condition. (CBD-21, CBD-22)

Response*: Historic conditions and climate change were only some of the considerations in determining the desired conditions. Natural ranges of variability are considered a "best" estimate of a resilient and functioning ecosystem because they reflect the evolutionary and historical ecology of forests. Natural ranges of variability are thereby a powerful template for improving the resiliency of frequent-fire forests. By restoring resiliency, current frequent-fire forests will be better able to adapt with changed climates and environments. Additionally, the effects of climate change are uncertain, and the historic range of variability is not. Desired conditions reflect both restoration and adaptation in restoring and maintaining resilience in forest ecosystems. For more information, refer to "Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated August 2013," which describes the process and science backing the development of the Regional Planning Desired Conditions.*

Climate change is addressed throughout the revised plan; indirectly through desired conditions in the form of functional ecosystems and resilient landscapes, and directly in management approaches and the monitoring plan, where appropriate. EIS appendix D provides a more detailed explanation of the strategy the Kaibab NF is using to address climate change.

Comment: Relying on evidences as an absolute basis for determining residual tree density targets is likely to underestimate the natural variability of forest structure. (SC-5)

Response*: Pre-Euro-American tree evidences are not exclusively used to determine target tree densities, but are useful to inform about historical conditions prior to the time when cessation of natural frequent fires occurred. This has led to conflict and delays related to conflict resolution. Evidences may be used to inform what the lower part of this range might be for any particular site, but many other factors play a role in determining what the actual residual stocking for an area could be. Other resource needs (wildlife, visuals, soils, fuels, etc.) and issues were considered in developing this range.*

Local research has shown that biological evidences are fairly robust indicators of the naturally variable forest structure that was historically present, with the reliability of field-based reconstruction techniques falling within 10 percent (e.g., Moore et al. 2004). See Vegetation, Fuels, and Fire Specialist Report.

Comment: The PNVT concept assumes that plant community succession is a unidirectional process leading to a steady-state condition, an arbitrarily selected successional trajectory assumed to develop without disturbance. (CBD-28)

Response: *The PNVTs assume a range of structure, composition, and dynamics characteristic to the ecosystem, including successional patterns in the natural disturbance processes are intact. There is no assumption of a unidirectional process. This is reflected in the Vegetation Dynamics Development Tool (VDDT) model, which is a state and transition model that shows probabilistic and not deterministic transitions for succession. PNVTs are used primarily as a descriptor of a vegetation community, and do not imply management toward a vegetative end-state. The desired conditions describe the range of conditions that are desired for each PNVT.*

Comment: The DEIS states that "With thinning from below, it takes longer to achieve a multi-storied state, if it is ever achieved" without explaining why this is the case. (SC-92)

Response: *By definition, multistoried (uneven aged) stands have at least three age classes of trees. When there is a limitation on the trees that are available to be cut, the only way to meet desired densities (to increase growing space and reduce competition) is to remove the smaller size classes. When the smallest size classes are removed over time, it results in less age diversity in the stand. This clarification has been added to the FEIS.*

Comment: The DEIS (p. 299) notes that, "the vegetation characteristics of our large, open states today do not exactly correspond to the vegetation characteristics of the large, open states in reference conditions; but for the purpose of this analysis, this was the assumption." Please provide further explanation. (SC-100)

Response: *The statement that was included in Appendix B describes the methodology used to evaluate the potential outcomes of various strategies. It acknowledges that historic conditions are similar but do not exactly correspond to States J and K as described in the VVDT model. The model states have a select group of variables including broad classes for dominant tree sizes, canopy under or over 30%, and whether they are single or multistoried. As a result, they cannot fully reflect the variability found in the reference conditions. This clarification has been added to the FEIS.*

Comment: Even though the draft plan says that reference conditions should only be used as a guide, the modeling of the effects analysis has very specific target conditions. (SC-3)

Response: *We selected conditions for modeling the effects to vegetation based on the midpoint of the desired range. Plan language accurately reflects the Kaibab NF's management approach regarding reference conditions. The vegetation modeling is not intended to reflect every treatment possibility, but to give insight into the average probable outcomes and provide a relative basis for comparing alternatives. We added clarification to appendix B of the FEIS to ensure this is clear.*

Comment: VDDT and PNVT analyses would be more compelling if they had been subjected to unbiased peer review. Please state the level of review, accountability, and accuracy of these analyses. (LS-12, WILD-2)

Response*: We used the VDDT model to assist in evaluating the relative differences among alternatives; it is not presumed to be a predictive model. All steps in the process were developed using the best available information. ESSA Technologies is the environmental consulting company that developed the model; information on ESSA Technologies and the VDDT modeling application can be found on their website: http://essa.com/tools/vddt//. A review of this website, including the "Reports and Publications" section, demonstrates that this landscape modeling framework is state-of-the-art and has been used widely in the United States and Canada.*

Use of the VDDT model in support of revising forest plans in the USFS Southwest Region, including the Kaibab NF, has been thoroughly documented in several white papers that are included in the analysis records. Three are published and peer-reviewed, including one refereed journal. See Weisz, R., J. Triepke, and R. Truman. 2009. Evaluating the ecological sustainability a ponderosa pine ecosystem on the Kaibab Plateau in Northern Arizona. Fire Ecology 5(1): 100–114. Additionally there have been two papers published in Conference proceedings (Weisz et al. 2011 and Weisz et al. 2009).

The state and transitions inputs into the model used for the Kaibab Forest Plan analysis were built using peer-reviewed literature and the best available science. Inputs for probability of occurrence under current management came from rates of treatment and known disturbances. The vegetation data on the distribution of states came from the mid-scale data provided by the Southwestern Regional Office following a nationally consistent process. The indices developed for comparing alternatives relate to specific desired conditions. Appendix B in the EIS articulates each component of the modeling to provide increased transparency. See appendix B for more detail about the assumptions and process of the VDDT modeling and vegetation analysis.

Comment: The draft plan and DEIS are silent on impacts of removing the standards related to canopy and old growth densities. This management shift would allow a significant change in forest structure to occur and the effects should be assessed. (SC-93)

Response: *The EIS analyzes the current plan (alternative A – no action) and compares it to the revised plan and alternatives. It focuses on the outcomes of the alternatives rather than the presence or absence of plan components written in a specific way. The canopy cover and densities called for in the 1988 plan (as amended) left the landscape at greater risk of stand replacing fire and were not open enough to support desired understory diversity. These differential changes in anticipated forest structure are discussed throughout the EIS.*

Comment: We support a broader range of target basal areas, groups, and sizes; and less extreme openings. The Forest Service preferred alternative would create an extremely open condition at all spatial scales, with a cookie cutter approach to the percentage of openings that is incompatible with desired conditions of variable group sizes, including larger groups. (SC-97) The high end of the basal area should be extended to prevent a cookie cutter, 40- to 60-square feet per acre basal area result at the fine-scale. (SC-18b)

Response: *The basal area range for ponderosa pine at the mid-scale is 20 to 80 square feet per acre, which is supported by science. The mid-scale describes conditions when averaged over 100 to 1,000 acres. Fine-scale units (less than 10 acres) would be expected to have greater*

variability, not less. At the fine scale, the desired condition for ponderosa pine and frequent-fire mixed conifer is that "density is variable," and there are no limits to basal area at the fine scale, greater variability is not only acceptable, but desired. The desired basal area was specified at the mid-scale to allow for greater variability at the fine scale, not less.

Comment: More specific information regarding the post-treatment stand structure needs to be included to determine the possible impacts of the proposed action on site-specific post-treatment canopy densities and, basal areas, and diameters. (SC-6)

***Response**: This level of site-specific detail is not appropriate for the plan. The plan lays the broad framework for stand structure in the form of desired conditions. Projects implementing the plan would provide the specific information about post-treatment stand structure based on the existing conditions and the objectives of the specific proposed project.*

Comment: All scales of the desired conditions should contain target ranges for the same structural attributes, such as basal area, structural stages, opening sizes, percentage of opening or any other parameters used in the effects analysis. (SC-17)

***Response:** Not all variables are appropriate at all scales, because at the fine scale, a lot of variation is expected and desired. Some less common components may not be present at the finer scales, but are desired within the landscape. See chapter 1 Plan Implementation section for additional discussion.*

Comment: The desired conditions at the mid-scale state that basal area will generally range from 20 to 80 square feet per acre with openings typically ranging from 10 to 70 percent. Are the opening percentages per acre or on a larger scale? (SC-18a)

***Response**: It is per acre, when averaged across the mid-scale. The mid-scale desired conditions "have descriptions that would be averaged across areas of 100- to 1,000-acre units. Additional detail can be found in chapter 1 of the plan in the Plan Concepts section.*

Comment: The desired conditions for the ponderosa pine and mixed conifer vegetation types should include language that larger groups are possible particularly on northerly aspects or on highly productive sites. (AGFD-7) Larger group sizes with a broader range of maximum group sizes should be provided. (SC-11) Without a broader range of group sizes, the less than an acre average will become a "maximum" management constraint. (SC-12)

***Response:** We modified the language to indicate that it is desirable for larger tree groups to occur by adding "… but may be larger, such as on north-facing slopes." The desired conditions do support even-aged stands (mid-scale units) to occur as a minor component of the landscape. If the intent was for the typical group size to be a maximum management constraint, the statement would have been in the form of a standard or guideline, not a desired condition.*

Comment: The draft plan states, "Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees." Given the group definition, is this per acre, or per group? (SC-13)

***Response:** It is per group, as stated in the plan.*

Comment: The desired conditions should specify a range of acres for the size of forest openings. (AGFD-6)

Response: *We added language to the plan stating that "regeneration openings occur as a mosaic and are similar in size to nearby groups." This articulates that management-created regeneration openings should be a size similar to nearby groups, as they are intended to create replacement groups, which are typically less than one acre in size.*

Comment: The maximum size of openings is not defined except for those pertaining to large uneven-aged stands. (SC-34)

Response: *The standard that specifies the maximum size of openings for even-aged management comes from national direction (NFMA, 36 CFR, FSH, etc.). This type of even-aged management (clearcutting) is infrequently used on the Kaibab NF. However, it may be used when it is the optimum method for making progress toward the desired conditions, such as where there are undesirable levels of dwarf mistletoe, other severe damage, or a desire to regenerate aspen in specific locations.*

Comment: Creating regeneration openings may be the equivalent to creating even-aged tree groups over time, which is counter to what is known about historic patterns of regeneration in southwestern forests (see White 1985). (AGFD-18)

Response: *Other literature indicates reference conditions in ponderosa pine that include even-aged groups (Cooper 1960) and a mixture of both even- and uneven-aged groups (Reynolds et al. 2013). The desired condition described within the revised plan at the fine scale does not exclude uneven-aged groups. It states that "Trees within groups are of similar or variable ages…." The commenter assumes that the creation of regeneration openings will lead to even-aged groups over time. This is not completely true. Older reserve trees can still be retained in regeneration openings that will provide uneven-aged structure with groups. Regeneration openings will not always completely regenerate to pine all at once. Pine that fills in openings around and within groups at a later time will also provide some age and size diversity within tree groups. The revised plan does allow for maintaining and developing uneven-aged tree groups*

We added clarification to the Management Approach section for vegetation management to specify when even-aged prescriptions are appropriate. Depending on the initial conditions, even-aged treatments are sometime the most efficient and effective pathway toward uneven-aged conditions across the mid- and landscape scales. As the historic fire interval is reintroduced, heterogeneity at the fine scale will increase over time.

Comment: The draft plan and DEIS do not adequately define openings and discuss the relationship between openings and regeneration cuts. (SC-8)

Response*: We added definitions for "regeneration openings" and "interspaces" to the glossary.*

Comment: Openings that were created by the logging should not be openings to be maintained over time. The impacts of existing management created openings should be considered when proposing the creation of new openings. This should apply to all spatial scales. (SC-10)

Response: *The plan desired conditions and guidelines would maintain the general spatial pattern of historical openings. The "potential," not the "existing" vegetation conditions that determine the desired conditions following site-specific analysis using historical evidences and soil characteristics would be used as a guide. As a result, management-created openings would not typically be expected to regenerate and develop into new forest structural stages over time.*

Comment: The desired conditions for openings state that the openings are variably shaped, but do not provide a range of potential sizes or a maximum size. However, the Vegetation Development Dynamics Tool (VDDT) model contains targets for basal area as they relate to canopy and openings that differentiate open and closed conditions. (SC-14)

Response: *VDDT is not spatially explicit and does not model opening size, but it does contain three descriptive density classes: openings, open forest states, and closed forest states. In VDDT modeling (EIS, appendix B), openings have canopy cover less than 10 percent, "open" states have canopy cover between 10 and 30 percent, and "closed" states have canopy cover greater than 30 percent.*

There are two types of openings: regeneration openings and interspaces, both of which are defined in the glossary. In response to this comment, we added a statement to the fine-scale ponderosa pine and frequent-fire mixed conifer desired conditions that "Regeneration openings occur as a mosaic and are similar in size to nearby groups." This relates to the existing desired condition statement that tree groups "typically occur in areas less than one acre." Between draft and final, the term "openings" was replaced by the word "interspaces" to differentiate the two types. The term "regeneration openings" was added to the glossary.

Mid-scale desired conditions place practical constraints upon the size of openings that are not explicit because the desired conditions contain minimum mid-scale densities (20 square feet per acre of basal area in ponderosa pine, 30 square feet per acre of basal area in frequent-fire mixed conifer), require a range of basal areas (up to 80 square feet per acre in ponderosa pine, up to 100 square feet per acre in frequent-fire mixed conifer), and specify the Kaibab NF is generally uneven-aged. To meet these desired conditions, openings would be limited in both size and extent.

Comment: The models used in the effects analysis looked at movement of opening sizes and locations over time. We assume there are data available regarding a range of opening sizes which could inform the desired condition. (SC-15)

Response: *The VDDT model is not spatially explicit, but it assumes a shifting mosaic of conditions over time as the result of various disturbances. The assumptions about opening sizes were derived from a combination of studies on historic natural disturbances (fire, insects, disease, etc.) and the sizes of openings created from different management prescriptions.*

Comment: The guidelines only mention regeneration openings in relationship to being adequately stocked as opposed to discussing how these relate to the percentage of openings in the desired condition. Does the Forest Service anticipate the need to achieve stocking levels with planting? (SC-35)

Response: *Regeneration openings are intended to become future groups. These areas are typically less than one acre in size with enough seed-producing trees nearby to achieve adequate stocking with natural regeneration. The only objective in the plan for planting trees is for areas that burn with uncharacteristic fire and lack adequate seed sources. No other tree planting is anticipated, although a project could propose planting to meet a specific need.*

Comment: Shade provided by closed canopy shields the ground from direct solar radiation, reduces ground temperature and horizontal wind speed, and increases ambient relative humidity and fuel moisture compared to open stands. (CBD-38)

***Response**: We acknowledge that there are benefits to shading and maintaining moister microclimates at the fine scale, However, in the fire-adapted ecosystems of the Southwest, high tree densities associated with closed-canopy conditions can lead to competition-related stress, decrease forest diversity by reducing development of other vegetative species in the understory, and support active crown fire that is outside the historic range of variability. Closed-canopy cover conditions can also lead to diminished snowpack through interception and sublimation.*

The revised forest plan allows greater interspaces between groups of trees. This greater distance between groups of trees decreases the likelihood of wildland fires being able to move for large distances through the forest canopy and consuming large areas of trees within the forest canopy. Wider forest openings increase the chances that wildland fires will move primarily along the forest floor. Surface fires are much less destructive to the forest canopy and the associated forest ecosystem. The revised plan also calls for maintaining groups of trees so that while there is an increase in openings around groups of trees there is also a large portion of the forest where denser tree conditions exist. These higher density areas will provide the many desirable attributes associated with a higher density of trees (interlocking crowns, wildlife cover, shading, moister microsites, etc.). The revised plan thus allows for protecting and retaining the forest while still maintaining the desirable structural attributes associated with trees of higher densities. The revised plan also will develop a forest with much more diverse vegetative and structural conditions than a forest with a closed canopy would allow.

Comment: What are the expected sizes of tree groups and expected canopy cover with a 10 to 20 percent increase in the 20 to 80 square feet per acre basal area range of the general forest structure as described in the desired conditions for ponderosa pine at the mid-scale? (SC-76)

***Response:** The draft plan states that the expected group sizes would vary depending on site conditions but "typically occur in areas less than one acre." Language was added to this desired condition statement in the revised plan to acknowledge that group sizes "may be larger, such as on north-facing slopes."*

The expected canopy cover would depend on scale and arrangement. At the fine scale (an area 10 acres or less), canopy could range from very open to very dense (i.e., 10 to 95 percent). At the mid-scale (100 to 1,000 acres), canopy would be expected to be higher in an area with larger, lower density groups than another area with the same basal area containing small, dense groups. This variability is one of the reasons that percent canopy cover was considered a poor metric for describing desired conditions in the proposed plan.

Comment: We disagree that canopy should only be measured at the group level. (SC-9) Measuring canopy only at the group scale allows the Forest Service to meet the guidelines on paper while failing to meet them on the ground. (SC-75) The plan and DEIS should disclose how canopy will be measured and at what spatial scale these measurements will occur. (SC-7) Forest Service staff from the regional office previously stated that the canopy requirements in the Management Recommendation for the Northern Goshawk (MRNG) RM-217 relating to VSS 4, 5, and 6 apply to the group level. Since the discussions were about the MRNG, is it correct to assume that this opinion will apply to the larger Kaibab National Forest planning area? (SC-72)

***Response:** The plan and its alternatives do not specify how canopy should be measured. Only alternative A (no action) has canopy cover guidelines. If no action is the selected alternative, current management direction would continue and canopy cover guidelines would only apply to*

groups of VSS 4, 5, and 6, regardless of the areal extent evaluated. Under the action alternatives, VSS is not used, and therefore, the canopy cover guidelines do not apply. Instead, the desired conditions provide direction consistent with the MRNG.

Comment: The guidelines in alternatives C and D call for maintaining trees established after 1890, but the caps as currently written would cut mature yellow-barked trees that are smaller than 16 inches. (SC-33)

Response: *The guideline in alternatives C and D only refers to approximate age and not diameter.*

Comment: Given the extreme rarity of large trees and the overabundance of small trees, the harvest of trees larger than 16 inches diameter at breast height (d.b.h.) cannot be justified on ecological grounds. Therefore, an upper limit of 16 inches d.b.h. is necessary to preserve the large tree structure critical to wildlife habitat, forest health, and general aesthetics. (CBD-71)

Response: *It is not true that an upper tree removal limit of 16 inches d.b.h. is needed to preserve large tree structure. Large tree structure can be maintained over time without this arbitrary diameter limit (Triepke et al. 2011). The revised plan provides for the large tree structure critical to wildlife habitat, forest health, and general aesthetics through desired conditions and vegetation management guidelines: "projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained" and "prescriptions should generally not remove: large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs" (e.g., Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B).*

The presettlement tree guideline of alternatives C and D was modeled as a 16-inch maximum (as a proxy because the model was not sensitive to age). The modeled effects of a 16-inch diameter cap demonstrated an increase in stand-replacing fire, resulting in a net loss of large and old tree structure critical to wildlife habitat and forest health.

Comment: We question the need for removal of presettlement trees in this situation as large stands of old growth trees may be important local sources of biodiversity when compared to the larger landscape that is generally deficient of presettlement trees. (AGFD-15)

Response: *The plan guidelines apply to the entire forest for all projects. Cutting presettlement trees may be necessary in some areas to achieve the desired density and reduce the potential of total loss due to uncharacteristic fire: to address local insect, disease, or public safety issues; and to move the forest toward uneven-aged conditions desired by the revised plan. It would actually be a fairly rare circumstance where presettlement trees would be removed under the revised plan as the plan contains direction to retain most of these trees. Before taking any action on the ground, site-specific planning would be used to address the specific needs of the area and may establish more restrictive guidance. The desired conditions were developed to reflect the historic conditions. Peer-reviewed reconstructed conditions for southwestern ponderosa pine and frequent-fire mixed conifer indicate that old-growth structure was not historically found in large contiguous areas, but rather at finer scales across the landscape. Two guidelines in the proposed plan provide guidance for retaining older trees, one specific to old tree structure (e.g., Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B), and one that would*

"retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained."

Not all areas on the Kaibab NF show a deficit in presettlement trees. On the North Kaibab Ranger District, there are more trees over 20 inches in diameter than there were historically, many of which were established before Euro-American settlements.

Comment: The DEIS acknowledges that old growth trees do not exist as they did historically (page 299), but the guidelines in the draft plan do not discuss means for making up deficits. (SC-30)

Response*: The guidelines do address retaining "at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained." These guidelines, along with a suite of desired conditions (old growth, uneven-aged conditions, mature trees interlocking crowns, etc.), would direct for the restoration and maintenance of old growth making up deficits where they occur.*

Comment: The EIS should provide a spatially based discussion of the extent, distribution, and structural qualities of old growth as well as a scaled analysis of its current status and projected future structure, composition extent and distribution. (CBD-16, CBD-39)

Response: *The EIS analyzes the ability of the alternatives to achieve and maintain the old-growth desired conditions and species habitat, but a detailed analysis of existing old growth is not required. For other purposes, the Kaibab NF does conduct analyses using a variety of sources of vegetation structural data that inform and consider the existing spatial extent, distribution, and structural qualities of old growth at different scales when comparing existing conditions to desired conditions during plan implementation and project design.*

Comment: All old growth that meets the standards and guidelines in the current plan should be deferred and there should be standards and guidelines to designate old growth habitat at the site, watershed, and ecosystem scales. (CBD-40)

Response: *The desired conditions were developed to provide for a flow of old-growth conditions and function over time at the fine, mid, and landscape scale. The desired conditions provide for spatial shifting or transition of old growth on the landscape over time, consistent with historic conditions.*

Comment: Standards and guidelines should specifically address the problem of fragmentation of old growth caused by past even-aged timber management and road construction, and apply spatially explicit direction showing that old growth systems will be sustained over time. (CBD-42)

Response: *The plan lays out desired conditions and guidelines that provide general direction for possible management, regardless of an area's history. Where existing conditions differ from desired conditions, there is a need for change. Finer, more spatially explicit direction is determined at the project level. The revised plan does specify that it is a desired condition to have old growth throughout the landscape, but that its location shifts over time as a result of succession and disturbance in ponderosa pine and frequent-fire mixed conifer, where a high degree of age-class interspersion (fragmentation) is natural, and therefore desired. For mesic*

mixed conifer/spruce-fir, the plan has a desired condition at the landscape scale that old growth occurs over large areas as stands or forests.

The fragmentation concept is not applicable for frequent fire forests in the Southwest. The fragmentation concept is applicable to infrequent-fire forest ecosystems where large blocks of even-aged old growth develops and persists over long periods of time (e.g., coastal Douglas-fir or high-elevation spruce-fir), based on the ecology of these forests. In southwestern frequent-fire forests, old growth is naturally fragmented, and occurs as tree groups, clumps, individual trees, and occasional patches in an uneven-aged forest landscape.

Comment: The plan should contain standards and guidelines for maintaining and developing a well-defined block of old growth in each project-level assessment area. (CBD-43)

Response: *The revised plan provides for goshawk nest areas, which are typically well-defined tree groups that meet the definition of old growth. Additionally, the revised plan has a guideline that is intended to provide for old growth consistent with its historical occurrence: "Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained."*

Comment: Due to climate uncertainties, the removal of large, mature or old growth trees may constitute an irretrievable commitment of resources. (CBD-60)

Response: *While the plan would allow the removal of large, mature, and old trees, the vegetation analysis demonstrates that the plan would result in a net gain of large trees over time, and more than any other alternative. Therefore, the plan would not result in an irreversible or irretrievable commitment of resources. Moreover, managing for restored forest conditions that are similar to natural conditions will restore resiliency and the evolutionary environment of these forests, providing the best opportunity for these forests to persist and adapt to future climates (Reynolds and others 2013).*

Comment: The draft plan states, "Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth." The Forest Service seems to have determined that old growth only occurs on a small scale. (SC-21)

Response: *Research has demonstrated an inverse relationship between fire frequency and old-growth contiguity. In the ponderosa pine and frequent-fire ecosystems of Kaibab NF, local research has shown that old growth did not occur in large contiguous areas, but rather as fine-scale components of the uneven-aged system (Reynolds et al. 2013). There is no scientific basis to support managing for contiguous old-growth conditions at larger scales for these vegetation types on the Kaibab NF.*

Comment: The 1996 plan contained minimum structural attributes to provide old growth. The DEIS should have displayed how much of the Kaibab meets the current landscape scale old growth requirements and assess the impacts of removing those standards. (SC-22)

Response: *While the revised plan does not provide "minimum structural attributes," it does contain management direction for old growth through the desired conditions and guidelines. It describes old growth and old-growth components for all forest and woodland vegetation types, which all projects must either maintain or make progress toward. Additionally, the vegetation*

management guidelines provide direction not to remove structural components associated with old growth including "Large, old ponderosa pine trees, mature trees with large dwarf mistletoe-induced witches' brooms, large snags, partial snags, and trees (greater than 18 inches d.b.h.) with broken tops, cavities, sloughing bark, and lightning scars." The guidelines also state that the project "should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained."

Tables 5 and 6 of the EIS show that the current percentage of the landscape in "State K" (described as open, multistoried, and dominated by trees greater than 20 inches d.b.h.) is 2 percent in ponderosa pine and 0.5 percent in frequent-fire mixed conifer. These tables also show the anticipated changes over time as modeled under each of the alternatives including the original 1988 plan (as amended).

Comment: To preserve the greatest biological diversity, all old growth trees regardless of size, and the larger diameter trees that would become the next generation of old growth should be retained. (SC-23)

Response: *While the Kaibab NF does seek to preserve biodiversity and provide for old-growth structure and components over time, we do not believe that a guideline to retain all presettlement trees is sustainable for all areas forestwide. Projects may include such design features, where needed, to achieve and maintain the plan desired conditions and increase resiliency over time.*

Comment: None of the action alternatives contain retention guidelines that would retain old growth trees. At least one of the alternatives should contain a retention guideline similar to the Four Forest Restoration Initiative that has only a few exceptions. (SC-25, SC-84, AGFD-16a)

Response*: All of the action alternatives contain guidance for retaining "old growth" trees. Guidance not to remove large or old trees can be found in the "Guidelines for Vegetation Management in All Forested Communities" in the plan. The guidelines provide direction to leave logs, snags, and large, old trees. It states that the projects "should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained." Appendix C in the plan specifies the structural characteristics associated with mature and over-mature trees that are addressed in the revised plan's tree retention guideline. Alternatives C and D contain a guideline that would not cut trees with physical characteristics indicating they were established prior to 1890. These alternative retention guidelines were evaluated and compared in the EIS.*

Comment: The old growth tree retention in the plan should be consistent with the Four Forest Restoration Initiative. (SC-84)

Response*: The revised plan guidelines provide direction that sets outer bounds and are intended to be broader than what might be needed for site-specific projects. This allows for flexibility for projects to be more restrictive, when needed, to effectively make progress toward the desired conditions. Because 4FRI is a project that fits within the bounds of the plan guidance, 4FRI is consistent with the plan.*

Comment: The tree retention guideline should include Thomson Age-class 3 (intermediate-mature), which includes trees approximately 150 years and older. (AGFD-16b)

Response: *In areas where there is a deficit of mature and intermediate-mature trees, Thomson Age-class 3 trees would typically be retained. This is provided for with the vegetation guideline that would "retain trees by species across broad age and diameter classes." Retaining all Thomson Age-class 3 trees on all projects could leave some areas more susceptible to fire, insects, and drought, and could impede achievement of desired uneven-aged forest conditions in many locations.*

Comment: We support a diversity of structural stages across the landscape with the intent of providing for old growth over time; however, the creation of regeneration openings is often used as an excuse to log old growth and large diameter trees. The EIS should specify the percentage of regeneration acres to occur and how these impact forest canopy. (SC-31)

Response: *The EIS did not calculate a percentage of possible regeneration cuts that would occur, but it does assume that the plan would be implemented. The revised plan says that mechanical thinning would be conducted on up to 19,000 acres per year in ponderosa pine and 2,100 acres of the frequent-fire mixed conifer areas per year, and that there would be a relatively even distribution of size classes. The EIS modeled mechanical treatments on suitable timberlands. Assuming about a 30-year cutting cycle and a balance of age and size classes, including older trees (180 years of age and greater it would be desirable for up to approximately one-sixth of the treed areas to be in young tree, grass, forb, shrub state (regeneration areas with low canopy cover). Group selection cuts for the purpose of regeneration would occur where needed following site specific analysis to move toward desired conditions in areas where the youngest size classes are underrepresented.*

Comment: The DEIS states that the protection of existing old growth and management that provides for future old growth were two of the significant issues that drove the development of the alternatives, but none of the alternatives as currently written appear to meet this need. The DEIS states that both alternatives C and D were developed to address this issue because the prescriptions call for cutting a significant number of old growth trees. (SC-83)

Response*: Alternatives C and D have a guideline that would not cut trees with physical characteristics typical of those established prior to 1890. This tree retention guideline was developed to respond to specific comments made by the commenter. The VDDT state and transition model used a 16-inch-diameter cap to represent trees established prior to 1890 and display the relative differences among alternatives over the long term. Under alternatives C and D, the guideline would be implemented as described, based on structural characteristics typical of presettlement trees, regardless of size. There are no prescriptions in the plan; prescriptions are developed at the project level following site-specific planning in accordance with the National Environmental Policy Act (NEPA). The plan does not call for cutting any "old growth" trees, but it would allow it doing so was within the plan guidelines and would make progress toward the desired conditions.*

Comment: The DEIS states that alternative C was developed in response to the issue that "the proposed plan does not adequately protect existing and provide for future old growth." Alternative C would change the draft plan definition of old growth and management guidelines based on age and structural characteristics, but the DEIS narrows the definition to trees generally larger than 16 inches d.b.h. Old growth should be described as a function of age not size. (SC-85)

Response: *Old growth is a function of age and not size. The 16-inch d.b.h. used in the vegetation analysis (VDDT modeling) was a surrogate for age.. The rational for this surrogate is described in appendix B in the EIS section "Calibrating the PPG Model for the Kaibab NF."*

Comment: The DEIS states that alternative B has a large old tree retention guideline because "...these types of trees are less abundant than in reference conditions and can take more than a century to replace if removed." We agree with a retention approach and the statement of scarcity. However, elsewhere in the document it is asserted that there has been an increase in all diameter classes over the last 100 years. (SC-94)

Response: *Both statements are true. Historic cutting, particularly in the southern Kaibab NF, has resulted in fewer of the very large old trees on the landscape (e.g., greater than 30 inches). The first statement refers to the trees specified in the tree guideline that are currently less abundant than reference conditions (see appendix C of the plan or appendix K of the FEIS. The second statement refers to the VSS diameter classes, where the largest class is greater than 24 inches. All VSS size classes have seen an increase in frequency over the last 100 years. We clarified these statements in the FEIS.*

Comment: The DEIS states that State K, best represents the desired condition in the preferred alternative and is described as, "Very large trees, open, multistory; 10-30% canopy closure; 20+" diameter class." It is unclear what scale the desired canopy closure is achieved. (SC-95)

Response: *The VDDT model and supporting data are "mid-scale." This is described in appendix B of the EIS.*

Comment: The alternative comparison has also been oddly constrained by the single entry before lands are removed from the suitable timber base contained in alternatives C and D. Alternatives C and D appear to have a single entry to achieve the conditions targeted in the desired conditions. While we understand the financial constraints the Forest Service is operating under this approach is not based on ecosystem needs, but economic needs. (SC-89, SC-81) Alternative C specifies that in the Kaibab Squirrel National Natural Landmark, mechanical thinning would be used to restore the desired structure and that it would then be removed from the suitable timber base, but the alternative description lacks specific information regarding restoration goals and the number of entries required to achieve those goals. (SC-87)

Response: *Specific needs vary by location. Some areas may require one entry (e.g., dense areas currently containing all of the desired components) and others would require a minimum of two entries (e.g., in currently even-aged areas to achieve multiple age classes). As a result, the specific strategies, prescriptions, and number of needed entries to achieve desired conditions are determined through site-specific analysis and project-level planning. The scope of the plan decision is focused on the broader guidance that sets out desired conditions, objectives, standards, and guidelines.*

Comment: The introduction states that the specific location, design, and extent of any activities are generally not known and the analysis only covers the potential for an effect to occur. While no site-specific proposal has been made, the models used specific target basal areas, openings and group sizes to predict percent openings based on the interspersion of clumps of trees and openings; the abundance of understory production, and associated potential fire behavior. (SC-90)

Response: *The conditions for the effects analysis and modeling were selected based on the midpoint of the desired range. The plan language accurately reflects the Kaibab NF's management approach regarding reference conditions. The vegetation modeling is not intended to reflect every treatment possibility, but to give insight into the average probable outcomes and provide a relative basis for comparing alternatives.*

Comment: Alternatives C and D are said to compare unfavorably with the preferred alternative because of the guideline to retain all presettlement trees established prior to 1890. These alternatives tie what we advocated for as retaining trees established in a natural fire regime into a diameter cap, which would not necessarily represent the historic forest structure. (SC-96)

Response: *The 16-inch d.b.h. used in the vegetation analysis (VDDT modeling) was a surrogate for age; therefore a diameter cap was used for modeling purposes to represent trees established prior to 1890. Age and diameter are correlated. It is a reasonable representation, given that the modeling results are used to reflect the relative difference among alternatives, not exact outcomes. The EIS analysis describes some of the effects expected under alternatives C and D, regardless of the modeling limitations. These include an increased risk of uncharacteristic fires and reduced amount of understory production due to the guideline that would result in leaving higher tree densities and a lower "interspersion" of age classes due to thinning from below that would be needed to reduce fire risk while retaining presettlement trees.*

Comment: The Vegetation Dynamics Development Tool (VDDT) model was used to evaluate changes and trends in forest structure, with State K representing the large, open, multistoried state in the mid-scale desired conditions. Given the data that exist and the capacity of the model, the effects analysis should be extended to the fine spatial scale. The fact that the plan is a programmatic document does not remove the obligation to display that desired conditions at the fine spatial scale can be met. (SC-91) While the VDDT model displays the DFC (State K) mid-scale structural attributes, the evaluation criteria all related back to fine-scale attributes. (SC-16)

Response: *VDDT modeling results are <u>all</u> at the mid-scale, and aggregated to the landscape scale. The results represented by VDDT are an aggregation of fine-scale attributes to produce a mid/landscape-scale projection. The effects analysis for vegetation interpolated the mid-scale outputs to describe the anticipated fine-scale conditions using expert opinion based on the prescriptions modeled and their ability to create certain desired fine-scale conditions (clumps and groups, interspaces, regeneration, etc.).*

Comment: The DEIS states (page 301) "Alternatives C and D have a guideline that would not cut trees that were established prior to 1890. Due to model and data limitations (data and models do not have an age variable); this guideline was modeled as a 16 inch maximum diameter limit or diameter cap." As a result, we are left to assume that modeling limitations were the issue? (SC-98).

Response: *The 16-inch d.b.h. used in the vegetation analysis (VDDT modeling) was a surrogate for age. The results were used for describing the relative comparison among alternatives only.*

Comment: The DEIS cites a document detailing the model development process called, "VDDT Analysis Process of the Kaibab National Forest" (Higgins 2011), but this document cannot be found on the Kaibab National Forest website or the Region 3 website. (SC-99)

Response: *The document "VDDT Analysis Process of the Kaibab National Forest" (Higgins 2011) was a preliminary process paper and was later edited for increased readability. This was included in appendix B in its entirety. The content was on the website, but was in the DEIS appendix B at http://fs.usda.gov/goto/kaibab/plan_revision It was not posted as a stand-alone document. We have corrected this reference in the FEIS.*

Comment: A structure-oriented approach can result in the aggressive removal of too many trees during the initial entry, which may seriously constrain ecosystem response and management options. (SC-4)

Response: *A structure-oriented approach is necessary to achieve the desired functional processes including natural disturbances and nutrient cycling. Equally of concern is removing too few trees, which would leave them at risk to stand-replacing wildfire and insect and disease epidemics.*

Comment: Prescribed burning is a risk reduction management tool that can be used to mitigate the undesirable effects of wildfires. Emissions from prescribed burning are typically much lower than those stemming from unplanned wildfires. Therefor the Forest Service should consider and disclose the benefits and potential liabilities of using prescribed fire at broad spatial scales. (CBD-55)

Response: *Emissions from prescribed fires and wildfires is discussed in the Air Quality section of the EIS. A comparison is made by looking at how well management activities under each alternative, including prescribed burning, reduce the likelihood of high-severity, high emissions producing fires. The potential effects that would result from implementing the action alternatives, which includes using prescribed fire to restore the natural fire regime, reduce fuel loads, increase nutrient cycling, protect wildlife habitat, is discussed extensively in the Vegetation and Fire section of the EIS.*

Comment: The forest should prioritize active fuel management where relatively little resource investment may facilitate ecosystem fire resilience, including low-productivity sites and relatively open stands dominated by large trees. (CBD-74)

Response: *The revised plan does not set priorities, although it does discuss priorities in the management approach sections, specifically the management approach in the fire management section of the plan states "Examples of such areas are steep rugged terrain where the high cost and hazards preclude mechanical treatment, or in remote areas of the forest where the distance to high values does not justify the expenditure of limited funds and work capacity. Fire can be successfully used in these areas to treat NFS lands at the landscape scale and at a minimal cost. Objectives allowing for higher fire intensities and higher levels of mortality may be needed in these areas to achieve the structural change that will not occur through other means."*

Comment: The plan and EIS should separate objectives for "Acres Treated" for by prescribed fire and naturally ignited wildfires. (KCC-2)

Response: *The objectives for acres treated with fire were established based on the ecological need to restore fire adapted ecosystems. The capacity of the Forest to implement prescribed burns varies yearly due to climatological conditions, budget restraints, and other limitations, and is unlikely to consistently occur at a rate that would meet the ecological need. To treat enough acres annually to approach the historic fire regime, lightning caused wildfires will need to be*

managed to perform their natural role in the ecosystem. Combining prescribed fire and wildfire in the objectives for ponderosa pine and mixed conifer underlines that it is not the ignition source, be it drip torch or lightning, that matters in restoring fire adapted ecosystems, but rather the broad treatment with fire across the landscape.

Comment: As modeled in the DEIS “ingrowth” over the planning horizon will exceed “harvest”. This will make it difficult to restore historic fire adapted forested ecosystems during this century. (KCC-3)

Response: *The mechanical thinning objectives were set based on the anticipated capacity during the plan period. While additional capacity would move the forest more quickly towards restored conditions, modeling shows that the projected capacity still makes progress toward the desired conditions. Additionally, some mortality and volume loss is expected that is not accounted for in the harvest when fire is combined with mechanical harvests.*

Comment: The draft plan indicates that it proposes to thin 11,000 - 19,000 acres per year on the NKRD. Considering the Forest Service’s present "capacity”, which is limited by appeals and budget, one wonders whether this can be accomplished. (KCC-5)

Response: *The objective applies to the entire Kaibab NF, not just the North Kaibab. While we hope to significantly increase acres treated on the North Kaibab, a lot of the acres treated would likely be accomplished on the Williams and Tusayan Districts through the Four Forest Restoration Initiative. Objectives are based on levels that we believe are achievable given current budgets and capacity.*

Comment: The objectives for prescribed and naturally ignited fire should be consistent with the fire return interval for forest and woodland types. The current objectives are less than half of what they should be. (MK-1)

Response: *We are aware that the objectives in the plan would not attain the historic fire return interval across the Kaibab NF in the “plan period,” which is the next 10 to 15 years. The objectives were set at a level that is possible to accomplish given the current high-risk state of the Kaibab NF, capacity to do the work, and public tolerances for smoke. As the forest structure and fuel loading approach the desired conditions, the fire return interval will also be closer to the desired (historic) condition, fire interval, but this may not happen for many years beyond the plan period.*

Comment: The plan should not implement widespread, high-severity treatments in the absence of a formal peer review process. A variety of treatments are needed to spread the risk because a one-size-fits-all approach to forest management is inappropriate. (WILD-1)

Response: *The planned restoration treatments modeled in the action alternatives are not considered “high-severity” in the peer-reviewed literature. For modeling purposes, one or two thinning or regeneration prescriptions were included and each may be applied with highly variable intensities that would be determined at the project level. The desired conditions for ponderosa pine and frequent-fire mixed conifer forest include wide variation on both fine-scale and mid-scale densities (Desired Conditions in Forest Resources section, chapter 2 of the plan).*

Comment: The forest should develop forest management standards and guidelines calling for the analysis of spatial dimensions of fuel treatments. (CBD-73)

Response: *The plan contains guidelines stating that "The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire" and "vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the reference conditions." This would necessarily call for the analysis of spatial arrangement during project design and be analyzed as part of the effects analysis for fuel treatment and restoration projects. Additionally, several questions in the forestwide monitoring plan also help to ensure effectiveness of these guidelines. Specifying the need for analysis would reiterate existing policy required by NEPA.*

Comment: Actively thinning small trees and intermediate-sized trees would retain most of the carbon pool levels, reduce potential wildfire emissions, and favor the development of large fire resistant trees which would better stabilize carbon stocks. (CBD-61)

Response: *While mechanical treatments typically focus on thinning the small and intermediate-sized trees to restore the desired uneven-aged desired conditions, over time it can reduce the representation of the desired younger age cohorts. Plan solutions to address carbon stocks include a combination of protecting the large trees from wildfire, opening up canopies to increase growth and sequestration rates, and encouraging a wood products industry that produces durable goods that store carbon over the long term. Huang et al. (2013) found that carbon storage increased in above-ground and below-ground residual live trees over time under thinning and prescribed burning treatments. Additionally, they showed that carbon stored in live trees over one century at all the five study sites was higher for two prescribed burning scenarios (prescribed fire every 10 years and prescribed fire every 20 years) compared with no treatments under two wildfire scenarios (wildfire return interval of 50 years versus wildfire return interval of 100 years). Hurteau and North (2009) suggest that a low-density forest, dominated by large, fire-resistant pines, may be a desired stand structure for stabilizing tree-based C stocks in wildfire-prone forests.*

Comment: Not only should vegetative characteristics fall within the desired range, but there should be full representation of conditions along the desired spectrum. (AGFD-14)

Response: *This was the intent, but to make it more clear, we added language to chapter 1 stating "Where desired conditions specify a range, the full spectrum of values within that range is desirable, although the desired distribution may vary depending on the resource."*

Comment: At a minimum, the forest should clearly outline when and why management would deviate from the "should generally" retain recommendation. (AGFD-17)

Response: *This comment refers to this guideline for vegetation management in all forested communities:*

> *"Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained."*

Interdisciplinary and leadership teams discussed striking the word "generally" from this guideline. If exceptions are made, the deviation would need to be specified in the decision documents. Although the intent is to retain these components when possible, a few exceptions would likely be needed in most projects to meet logistical and safety requirements and in some cases to facilitate moving existing forest conditions towards desired conditions.

Comment: The guidelines say that projects should retain historic frequencies of tree species, across broad age and diameter classes, but stops short by stating that the old trees to be retained should be large. (SC-29)

Response: *In addition to the guideline referenced above that states that " the largest and oldest trees are usually retained," there is also a guideline that specifies "treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs" (e.g., Thomson's age class 4, Dunning's tree class 5 and/or Keen's tree class 4, A and B [appendix C]).*

Comment: The desired conditions should ensure that all tree species are being retained. (AGFD-11)

Response: *The plan contains a guideline that addresses this concern. It states "Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale." This guideline specified to "retain historic frequencies by species." The desired conditions provide more specific guidance by PNVT. There are some PNVTs, such as cottonwood-willow riparian, where there are nonnative tree species such as Russian olive and tamarisk that should NOT be retained.*

Comment: Some concern that the costs of creating even-aged conditions outweigh the benefits for wildlife. (AGFD-8)

Response: *Chapter 1 of the plan states, "These desired conditions are integrated and are intended to reflect not only healthy ecological systems, but also the social and economic considerations needed for long-term sustainability." The desired conditions for most of the Kaibab NF are uneven-aged. Decisions about where even-aged forest structure may be desirable to create or retain are project-level decisions.*

Comment: The plan should manage for Gambel oak, not only where it occurred historically, but also where it may grow within its natural range on the Williams Ranger District. (DOI-2)

Response: *The desired conditions were developed to reflect conditions within the natural range of variability. Oak is recognized in the plan as an important and dynamic habitat component and there is no plan direction that would prevent an expansion within its natural range. However, oak species occur within specific biophysical site conditions (plant associations). It would be inappropriate to manage for oaks where biophysical conditions are not conducive and where they did not historically occur. Consistent with the concepts of ecological sustainability and restoration, there is no desire for oak to occur in areas where it did not occur historically.*

Comment: Tree-form Gambel oak occurs, but in the area, not just as snags or partial snags. Therefore, we recommend modifying the desired condition to include the desire for larger, tree-form oaks. (DOI-3)

Response: *The words "tree-form oaks" was added to the ponderosa pine desired conditions and to the guideline for wildland fire management.*

Comment: The vegetation management guidelines in the plan should include provisions for retaining large oaks. (AGFD-19)

Response: *We concur. In response to this comment, we modified the guideline to add "Gambel oak greater than 8 inches diameter at root collar" to the list of trees that should generally not be removed.*

Comment: The Forest Service should not drop the standards related to goshawk nest areas, post-fledgling family areas (PFA), and foraging areas. The structural requirements in the MRNG related to nest areas, PFAs, and foraging areas are described in terms of stand structures that occur across 30 acres for nest areas, 420 acres for PFAs, and 5,400 acres for foraging areas. Additional desired conditions for each forest type are also described in terms of stand characteristics. The draft plan and DEIS appear to have dropped this approach in favor of creating small groups surrounded by a high percentage of openings. (SC-73) The draft plan omits standards and most guidelines for management of ponderosa pine and its structural attributes contributing to nesting, fledging, and foraging habitat of the northern goshawk, retaining a few guidelines that says that they "should" consider. (CBD-49)

Response: *The revised plan does incorporate provisions of the "Management Recommendations for the Northern Goshawk" (RM-217) but not its exact language. There are guidelines for establishing nest areas and PFAs, and limiting human disturbance during the breeding season. The vegetation management guidelines also include provisions for retaining large, old ponderosa pine trees, mature trees with large dwarf mistletoe induced witches' broom, large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops, cavities, and Gambel oaks greater than 8 inches d.r.c. They also state that: projects "should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained." The desired conditions state that: "The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present." "Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes." "Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group." "Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, nesting/roosting habitat, drainages, and steep north-facing slopes). They state that "goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest." The desired conditions also describe numbers and sizes of key habitat components such as snags and logs for each PNVT. These and other plan components were developed to meet vegetation descriptions within the MRNG and provide for viability of the northern goshawk and its prey (see: Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013).*

Some of the more prescriptive provisions of the original forest plan (as amended) including canopy cover and vegetation structural stage (VSS) distribution were not retained for several reasons. The guidelines in the original forest plan (as amended) provided guidance intended to establish and maintain uneven-aged conditions over time. However, some literal interpretations

of the guidelines left some areas much denser than desired and did not provide for adequate interspace between groups. This was in part due to the fact that the original plan as amended was vague regarding the scale at which canopy cover and VSS would be measured.

Interspaces contribute to a wide range of other desired conditions including increased water availability, reduced competition, reduced potential for stand replacing fire, increased understory vigor and diversity, increased snowpack, and food and habitat for small mammals. The guidelines for canopy cover and vegetation structural stage (VSS) also proved to be difficult to measure and implement consistently. The prescribed distribution of VSS classes in the original plan (as amended) was developed to provide for uneven-aged conditions over time through recruitment and growth. The current plan also provides for uneven aged condition over time, but better reflects natural variation that occurs following periodic regeneration events typical of southwestern forest ecosystems.

Comment: The effects analysis should disclose the differences in estimated canopy cover between the current management and the proposed plan. (SC-77)

Response: *The EIS does not disclose the differences in estimated canopy cover between the revised plan and the original plan (as amended) because the methodologies for measuring canopy cover result in wide variation. To provide this analysis and disclosure, it would first be necessary to specify the scale, whether the metric was for total land area or across groups of mature trees, and methodology (vertical projection on a line transect, remote imagery, FVS, densitometer, etc.) Additionally, due to the spatial nature of canopy cover measurements; there is no reliable methodology for modeling forest canopy cover under differing plan alternatives.*

For these reasons, the revised forest plan generally uses basal area to describe the desired condition for tree density rather than canopy cover. The original plan contained language that addressed average percent canopy cover to specify tree density for goshawk habitat. The original plan was vague as to precisely how canopy cover would be measured and at what scale canopy cover would be measured. This lack of clarity led to misunderstandings of the recommended means for measuring canopy cover. The methodology for measuring basal area is more consistent than canopy cover. It is also more easily determined on the ground during project implementation. Basal area is more easily understood by a greater number of people so that there is a better understanding of what the plan is attempting to achieve. The revised plan also more clearly defines the scale that desired basal areas are applied to. Desired conditions for tree densities expressed as basal areas in the revised forest plan provide for goshawk habitat needs and would sustain goshawk population viability (Reynolds et al, 2013). It was not necessary to relate tree densities directly to canopy cover in the revised forest plan.

Mixed Conifer Forests

Comment: It appears the intention of the plan is to manage most mixed conifer forest on the Kaibab NF in a more open, ponderosa pine-dominated condition. (DOI-5)

Response: *Historically, most of the mixed conifer on the Kaibab NF was more open and contained at least a plurality of ponderosa pine. The desired conditions of the frequent-fire mixed conifer PNVT are within its natural range of variability and more consistent with frequent-fire disturbance regimes.*

Comment: The desired conditions should support smaller openings and larger tree groups within mixed conifer to accommodate the habitat requirements of species dependent on denser conditions. (AGFD-10)

Response: *While disturbances like root rot and wind throw, did historically create small openings in mixed conifer, the historic fire regimes more typically resulted in groups and openings being similar in size. Species that evolved with these systems should be accommodated by providing habitat within its historical range of variability. If there are situations where are specific concerns, the desired conditions are broad enough to permit larger tree groups in project design to meet site-specific objectives.*

Comment: The draft plan acknowledges the lack of agreement on treatment intensity and approaches for frequent-fire mixed conifer, and plans to use experimental design features and monitoring to accelerate learning and adaptive management, but adaptive management is not a substitute for creating a science-based panel from outside of the agency to address the issues of restoration in mixed conifer and spruce-fir. Before moving forward with treatments in mixed conifer, the Forest Service should create a science panel with broad representation from outside the agency to address the research needs of the agency. (SC-26, SC-32)

Response: *The plan desired conditions, objectives, and guidelines were based on research and management experience in the Southwest, including recent research on the Kaibab Plateau, that describe historic conditions and trends and restoration approaches for both mixed conifer and spruce-fir forests. We formulated regionally consistent desired conditions with consideration of this research and experience.*

The Kaibab NF did host collaborative workshops with a variety of experts and stakeholders to develop plan components for mixed conifer. Based upon this process and a lack of agreement about the optimal treatment intensity and design, a guideline was developed to use an adaptive experimental approach to increase learning and build trust. This was described in the management approach sections for frequent-fire mixed conifer and mesic mixed conifer/spruce-fir in the plan. Creating a science panel to address research needs of the agency is outside the scope of the plan decision, but could be explored during plan implementation.

Comment: The plan should provide more information regarding how mesic mixed conifer forest will be maintained. (DOI-4)

Response: *There are no objectives for mesic mixed conifer, and therefore, no "planned" activities. Should a project be proposed to address needs for change in a particular area, it would be developed to move toward the desired conditions within the standards and guidelines for vegetation management articulated in the plan. The proposed activities would be planned to address the site-specific needs.*

Comment: The reference in the draft plan and EIS to cork-bark fir on the North Kaibab Ranger District is an error on the North Kaibab Ranger District in the wet mixed conifer. It should be subalpine fir. (KCC -6)

Response*: We agree that subalpine fir is the more accurate term. This change is reflected in the final plan.*

Aspen

Comment: The plan and DEIS should include more detail about the historical acres of aspen as well as some indication about the amount of aspen needed for long-term sustainability. (RE-18)

Response: *Objectives and guidelines have been established to address concerns over aspen decline on the Williams and Tusayan Ranger Districts. The available research and data suggest aspen is stable to increasing on the North Kaibab Ranger District, declining on the Williams Ranger District, and minimal on the Tusayan Ranger District with no historic references. The available research for aspen on the Kaibab NF does not include historical acreage, although historical descriptions indicate it was not known to occur in large contiguous patches anywhere on the forest. Condition rather than amount is a better indicator of long-term sustainability of aspen.*

Comment: As written, the desired condition for aspen that states "coniferous species comprise less than 10 percent of the overstory" would support logging of the remaining ponderosa pine in the old seed cuts on the North Kaibab Ranger District where aspen has regenerated along logging roads and skid trails. (SC-28)

Response: *In response to this comment, we adjusted the desired condition to specify that the desire is that coniferous species do not shade and out-compete with aspen on the Williams and Tusayan Ranger Districts where it is of concern. The desired condition now reads "Within aspen stands, coniferous species comprise less than 10 percent of the overstory on the Tusayan and Williams Districts." It also makes clear that there is not a desire to reduce the coniferous overstory on the North Kaibab Ranger District where past management activities have resulted in aspen occupying areas they may not have historically.*

Comment: In the comparison of alternatives table in the DEIS chapter 2, there should be a row for aspen management for the Williams and Tusayan districts. (LS-20)

Response: *There was a row for aspen management in table 1 of the EIS, but we added language to clarify that the objectives were developed for the Williams and Tusayan Ranger Districts, where aspen decline is a concern.*

Comment: The list of potential aspen treatment options should be expanded to include fire, coppice treatments, jackstrawing, and ripping, and planting. (AGFD-13, WILD-6)

Response: *In response to this comment, we expanded the management approach for aspen: "Other strategies to promote aspen such as jackstrawing, fire, coppice treatments, ripping, planting, public education, and improving the forage and browse in the surrounding area to diffuse browse pressure on aspen may be used."*

Comment: Browsing on aspen is not limited to elk, suggest that the word "elk" be replaced with changed to "wild ungulate" and "livestock grazing." (AGFD-12)

Response: *We adjusted the wording to read "ungulate."*

Comment: The plan should not allow grazing by domestic livestock in areas with aspen and wetlands. (RE-19, SC-58)

Response: *Many aspen and wetland areas have already been fenced to exclude livestock, and more will be protected and restored through implementation of the objectives that would fence or restore aspen, springs, and wetlands at specified levels. Areas with site-specific resource concerns are prioritized. Additionally, a guideline for newly constructed waters says they should be located in areas that would reduce ungulate impacts to aspen and wetlands. By using these strategies, the Kaibab NF should be able to protect these important resources while providing for continued livestock grazing.*

Comment: The guidelines indicate that the plan will not do anything to protect aspen until grazing NEPA is done which could be more than 10 years away. (EBR-36)

Response: *This statement is inaccurate. The objectives for aspen are independent of the livestock grazing guidelines. Aspen protection and restoration has been and will continue to be addressed as a stand-alone need. Where there are site-specific concerns related to livestock grazing, they may be addressed in the annual operating instructions and throughout the season within the scope of the grazing authorization decisions.*

Standards and Guidelines for Vegetation Management in All Forested Communities

Comment: The standards and guidelines do not assure meeting the minimum management requirements (EBR-6). The 1982 planning regulations include mandatory "management requirements" including limits on the maximum size of management created openings and stream side buffers. If any of these standards are eliminated or changed, they must be fully analyzed in the EIS. (CBD-44)

Response: *The Standards for Vegetation Management in All Forested Communities states the "maximum size opening that may be created in one harvest operation for the purpose of creating an even-aged stand shall not exceed 40 acres except when it is following a large-scale disturbance event such as a stand-replacing fire, wind storm, or insect or disease outbreak." This is unchanged from the current plan.*

There are no standards for "streamside" buffers because the only perennial streams on the Kaibab NF are within the Saddle Mountain and Kanab Creek Wildernesses, which have desired conditions that maintain wilderness values, have no suitable timber, and do not allow motorized or mechanized equipment, and Forest Service Handbook and Manual direction that provide higher levels of protection.

The minimum management requirements specified in the 1982 planning regulations were addressed by the proposed plan and alternatives. Key minimum management requirements are in the vegetation management standards and guidelines, and some are addressed in the form of desired conditions. The EIS analyzes these alternatives.

Comment: The Forest Service should resolutely prohibit seeding with any species or stock other than those that are known to occur within 50 miles of the forest. (LS-15, WILD-16) "Genetically local sources" of seed can be difficult to procure. Consider the use of native seed sources from a regionally adapted area if local sources are not available. (AGFD-20) If seeding of understory vegetation is planned, will the Forest Service use native species? (SC-36)

Response: *While it is preferred to obtain seed from more local sources, it is often not available. There are currently too few seed sources within 50 miles of the Kaibab NF to meet the revegetation needs. We modified this guideline slightly to address the primary concern. It now reads "Seed and plants used for revegetation should originate from the same PNVT and general ecoregion (i.e., southern Colorado Plateau) as the project area."*

Comment: There should be guidelines in other vegetation types for minimizing the spread of cheatgrass similar to those written for sagebrush. (AGFD-5) The plan should include direction for minimizing spread and new infestations of cheatgrass. (AGFD-24)

Response: *The guideline was originally listed in vegetation management for sagebrush communities as, "In areas with moderate to high risk of cheatgrass invasion, fire should be excluded if adequate treatments are not available or if they are cost prohibitive." In response to this comment, it was moved to the Wildland Fire section of the plan, and it now applies forestwide. It now reads, "Evaluate the risk of cheatgrass invasion. When there is a moderate to high risk of cheatgrass invasion, mitigation measures should be developed. If adequate treatments are not available, or if they are cost-prohibitive, objectives to minimize the burned area should be developed." An additional guideline under nonnative invasive species specifies that "all ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species."*

Large-scale Disturbance Events in Forest and Woodland Communities

Comment: Areas affected by severe fire should be managed for natural recovery, not economic production. (CBD-9)

Response: *Plan guidelines for large-scale disturbance events primarily focus on restoring the land to meet desired conditions in the plan. The desired conditions are integrated and are intended to reflect healthy ecological systems as well as social and economic considerations as described in chapter 1 of the plan. The desired conditions for forest and woodland communities would not change after large-scale disturbances, including severe fire. Guidelines were developed to assist in attaining desired conditions in areas affected by large-scale disturbance, should a site-specific proposal be made following the disturbance.*

Comment: The EIS for plan revision must not equate post-fire logging with ecological restoration. (CBD-72)

Response: *We agree that salvage logging does not equate with ecological restoration; however, the FEIS vegetation and soil and watershed sections discuss that it can be a tool for achieving certain restoration objectives and desired conditions.*

Comment: Salvage logging should not be used unless it can be proven that it will not inhibit natural recovery or regeneration, increase nonnative invasive species, and/or increase soil compaction or erosion. (AGFD-21)

Response: *Salvage logging is an appropriate tool under certain circumstances. Site-specific decisions would specify the appropriate management response following large-scale disturbances after we evaluate the risks and benefits of any proposed activities including salvage logging.*

Comment: Planting trees in mixed conifer areas should not be done in areas that may have had a fire regime that included some naturally occurring stand-replacing fire. (AGFD-22)

Response: *In most cases, this is already true as the desire is to manage similar to the historic or natural fire regime. However, the Kaibab NF reserves the flexibility to plant trees to accelerate achieving tree cover where it is lost due to uncharacteristic fire and distant seed sources.*

Comment: When planting trees, the resulting structure should mimic historic conditions, i.e., plantings should be arranged to achieve a heterogeneous structure, or later be thinned to a more natural forest structure. (AGFD-23)

Response: *Agreed. Because projects are to be consistent with the desired conditions in the plan, project-level design for planting would incorporate design features to reflect the fine-scale heterogeneous desired conditions.*

Sagebrush Shrublands

Comment: The plan says sagebrush provides important habitat, but the guideline says that sagebrush must be severely degraded before any steps are taken. (EBR-16)

Response: *We deleted the word "severely." The guideline now reads "Where sagebrush communities are ~~severely~~ degraded, water should be strategically placed to improve animal distribution and reduce grazing impacts."*

Grassland Communities

Comment: The plan states that part of its strategy for restoring grasslands is to make a map of where they used to occur. It is unacceptable not to already have a map about an issue that is identified as a priority need for change. (EBR-25)

Response: *The Kaibab NF has Terrestrial Ecosystem Survey (TES) maps that show the grassland PNVT, and historic maps for many areas. From these, we have a good understanding of the approximate locations and extent of historic grasslands. However, delineations are needed for project-specific designs that take into account evidences of presettlement trees and soils at a finer scale.*

Comment: Desired Conditions for Colorado Plateau/Great Basin grasslands and semi-desert grasslands should include native plant dominance. (SC-40)

Response: *The desire for native plant dominance is already specified in the Desired Conditions for All Grasslands section where it states "Vegetation is dominated by herbaceous plants composed of a mix of native grasses and forbs." This desired condition applies, but is not repeated in each of the grassland types.*

Comment: The plan should include a guideline that states "Where historically occurring, grassland patches should be maintained by removing encroaching juniper." (AGFD-3)

Response: *This concern had already been addressed with an objective rather than a guideline. Needed management actions are addressed with objectives; guidelines are the sideboards to those actions. Because the desired conditions for the vegetation communities are identified by their*

PNVT, the grassland desired conditions apply when an area falls within the grassland PNVT (historically grassland) regardless of whether the area is currently encroached with trees. The objectives for grasslands would remove trees to restore 5,000 to 10,000 acres of historic grasslands annually.

Desert Communities

Comment: In the desert communities' desired conditions, the plan language should be changed from "Domestic livestock are absent." to say, "Domestic livestock and nonnative ungulates are absent." (SC-42)

Response: *This guideline states "domestic livestock are absent, except for recreation and administrative packing and riding animals." This guideline was intended to reflect the fact that the desert communities (which all occur in the Kanab Creek Wilderness) were identified as unsuitable for grazing following site-specific analysis. We did not include "non-native ungulates are absent" because there are times when it is desirable to have ungulate pack animals in the wilderness.*

Comment: "Native ungulates free from disease and domestic livestock are absent" seems out of place within a vegetation community discussion. (AGFD-25)

Response: *We added language to the plan to be more explicit that the concern is related to the potential for the spread of disease between bighorn sheep and domestic sheep and goats. We split the desired condition into two statements which now read "native ungulates are free from disease" and "livestock are absent, except for recreation and administrative packing animals." Additionally, we added a guideline to the livestock grazing section: "grazing of domestic sheep and goats should not be authorized on the Tusayan and North Kaibab Ranger Districts due to the proximity of bighorn sheep in the Grand Canyon and Kanab Creek to prevent the spread of disease between domestic and wild populations."*

Wetland/Cienega

Comment: Desired conditions for wetlands/cienegas should indicate that they be dominated by "native" plants. (SC-43a)

Response: *The word "native" was added to the desired condition. It now reads "Native plant and animal species that require wetland habitats..."*

Comment: Desired conditions for wetlands/cienegas should indicate that nonnative ungulates are absent. (SC-43b)

Response: *Many wetlands are already fenced to exclude livestock and there are objectives to protect and restore six additional acres within five years of plan approval. While there is a desired condition for wetland habitats to be healthy within the constraints of the particular wetland community, there is not a desire to exclude all nonnative ungulates. As a result, the suggestion that the desired condition state "nonnative species are absent" was not incorporated.*

Cottonwood-Willow Riparian Forest

Comment: The cottonwood-willow riparian section should say "dominated by deciduous species," not "predominantly composed of deciduous species." (SC-44)

Response: *The statement referenced is in the introduction section, which describes the vegetation type and existing condition, not the desired condition. The suggested language was not incorporated because it would not be accurate.*

Comment: In the description for cottonwood-willow riparian forest it says “This vegetation type is found adjacent to surface water, such as streams and springs” it should also say “and in places where shallow ground water is consistently available.” (SC-45)

Response: *We added the suggested language to the description of the vegetation type.*

Comment: The desired condition Cottonwood-Willow Riparian Forest the statement “Vegetation is characterized by willow and other herbaceous understory species. Snag and gallery tree components comprise 55 percent mid-aged to mature cottonwood and willow trees, 25 percent younger trees and 20 percent in grass, shrubs, suckers, seedlings, and tree sprouts,” should also include “forbs.” (SC-46)

Response: *We added the word “forbs” to the desired condition statement.*

Comment: The Plan should have maintained the standard that "three age-classes of woody debris be maintained along streambanks. (EBR-3)

Response: *Standards are intended to put sideboards on activities. On the Kaibab NF, the only streams are within designated wilderness. The wilderness designation puts significant limitations on vegetation management activities that affect woody debris levels. In the revised plan, this standard has been addressed more appropriately through desired conditions “Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting,” and “the necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species.*

Comment: The desired condition that states “When nonnative vegetation is present ...” should not be a desired condition. It is understood that the forest is likely referring to tamarisk here, but it currently reads as if “nonnative” vegetation is a goal. The desired conditions for cottonwood-willow riparian forest (draft plan p. 37) should state that the area is “Dominated by native vegetation.” (AGFD-26, SC-47)

Response*: “Native vegetation dominates” was added to the desired condition, so it now reads “Native vegetation dominates, but when nonnative vegetation is present, the spatial and structural composition contributes to overall faunal diversity.”*

Comment: The desired conditions for cottonwood-willow riparian forest (draft plan p. 37) should add the desired condition “Soils and water are free from pollution that derives from mining activities.” (SC-49)

Response: *To address this concern, we added a desired condition to the revised plan in the soil section that states “Soils are free from anthropogenic contaminants that could alter ecosystem integrity or affect public health.”*

Comment: The Desired Conditions for Cottonwood-Willow Riparian Forest (Draft Plan p. 37) should change from "Grazing from domestic ungulates is minimal or absent." to "Grazing from domestic and nonnative ungulates is absent." (SC-48)

Response: *This suggestion was not incorporated because all of the cottonwood-willow riparian forest vegetation type on the Kaibab NF is in the Kanab Creek Wilderness where horses and pack animals are allowed for recreational and administrative use. This area is identified in the plan as "unsuitable for livestock grazing" and is not part of a grazing allotment. Therefore, the word "minimal" is appropriate.*

Comment: The management approach for cottonwood-willow riparian forest should add "Cap or move exposed mine waste and mine tailings that could be scattered during flood events." (SC-50)

Response: *There are no known mine waste sites on-forest or nearby that are likely to be scattered during flood events. Should a concern arise, it could be addressed with a site-specific proposal.*

Soils and Watersheds

Comment: There is nothing in the plan to support the assertion that "Watershed conditions have been generally static over the last 20 years." (SC-59)

Response: *The statement about watershed conditions being generally stable comes from the site-specific analysis and monitoring that has occurred over the past 20 years. Supporting documentation can be found in the project record at the Kaibab NF Supervisor's office, and in the ecological sustainability report on the Kaibab NF website: http://fs.usda.gov/goto/kaibab/plan_revision.*

Comment: There should be standards to protect soil productivity, prohibit vandalism of natural springs, and set limits to damage that livestock grazing may cause. (EBR-9)

Response: *The plan does not include standards to address these concerns because they are already addressed by plan guidelines or existing law, regulation, or policy. There are guidelines in the Soil and Watershed section of the plan, and National Best Management Practices to protect soil productivity. Vandalism of springs is intentional resource damage, which is illegal and already addressed by the Code of Federal Regulations (CFRs). The livestock grazing desired conditions and guidelines address grazing-related resource concerns. Site specific concerns are addressed through project-level grazing decisions that are made following an environmental analysis in conformance with the National Environmental Policy Act, and fine-tune adjustments are made annually through the annual operating instructions to minimize and mitigate adverse effects. Guidelines in the plan are not discretionary.*

Comment: The Affected Environment section of the DEIS should address the impaired and unsatisfactory soils in the grazing allotments. (EBR-30)

Response: *The affected environment section of the Soils and Watershed Specialist Report discussed the impaired and unsatisfactory soils on the Kaibab NF, but it was not included in the more condensed version that was published in the DEIS. We have added an excerpt containing the key points to the soils affected environment section of the FEIS.*

Comment: On page 159 there is an enticing hint that the Forest Service intends to consider the impacts to biological crusts, but then reveals that it knows essentially nothing except that reducing livestock grazing, which it is not going to do, would help. This too needs to be honestly addressed and revealed. (EBR-27)

Response: *The greatest risk to biological soil crusts is trampling from ungulates. The revised plan section for livestock grazing has a guideline that, "annual operating instructions should...address any relevant resource concerns." In addition, there is a soils desired condition that states "biological soil crusts (mosses, lichens, algae, liverworts) are stable or increasing in semidesert grasslands, desert, pinyon-juniper, and sagebrush communities." Therefore, if authorized grazing is not achieving or maintaining the desired conditions, management adjustments would be implemented. The soils and watershed section of the EIS and the supporting specialist report state that for all action alternatives "It is estimated that improved cattle management on the Kaibab NF that is currently being implemented will benefit biological crusts."*

The Kaibab NF does have limited information related to the presence and extent of cryptogrammic crusts in the House Rock Valley area of the North Kaibab Ranger District and the northwestern portion of the Tusayan Ranger District near the boundary with Grand Canyon National Park. The Kaibab NF is cooperating with Dr. Matthew Bowker, Assistant Professor of Forest Soils and Ecosystem Ecology at the School of Forestry, Northern Arizona University. Dr. Bowker's study is aimed at gaining information necessary for developing biological crust mosses as restoration materials.

Comment: The Forest Service should develop stronger relationships with adjacent land managers. Negotiations with the towns of Kanab and Fredonia, as well as the Utah Division of Water Resources, are needed to ensure or restore Kanab Creek stream flow quantity, and to limit groundwater depletion and water pollution. Negotiation with the towns of Tusayan and Williams are needed to ensure groundwater sustainability on those two districts. (LS-9, WILD-23)

Response: *We agree that stronger relationships and coordination with adjacent land managers, other agencies, and the towns of Kanab, Fredonia, Tusayan, and Williams would provide opportunities for improved adaptive management of natural resources, including groundwater resources on the Kaibab NF. The benefits and strategies of partnering are discussed in the management approach sections of the plan; however, this is beyond the scope of the plan decision.*

Comment: It should be noted that several of the 28 natural lakes on the North Kaibab are apparently spring fed. Bear and Deer Lakes, for example, retained water on the driest years (2000 and 2002), and likely are fed by groundwater. (LS-17, WILD-24)

Response: *The Soils and Watershed Specialist Report and FEIS have been revised to reflect the importance of spring ecosystems as sources of surface water in natural lakes on the North Kaibab Ranger District.*

Comment: Some proposed activities may require Arizona Department of Environmental Quality (ADEQ) water quality permits or approval. (ADEQ-1)

Response: *The Kaibab NF will obtain the necessary water quality permits or approvals from ADEQ for any activities requiring such permits or approvals prior to project implementation.*

Comment: The forest plan should have standards for litter (dead vegetation that forms ground cover). (RE-15)

Response: *Desired litter levels vary widely across the Kaibab NF depending on soil type, microclimate, vegetation type, etc. As a result, litter was addressed directly through desired conditions rather than as a standard, which only provides sideboards. The Kaibab NF uses these factors along with the TES to determine appropriate litter levels for project planning and decision making.*

Comment: Why was the former standard to correct unsatisfactory conditions not retained? (EBR-13)

Response: *The revised plan does contain direction for correcting unsatisfactory soil conditions. Because forest plans cannot compel activities, it was not articulated as a mandate. Instead, the revised plan lays out a strategic framework that specifies desired conditions (desired outcomes), objectives (activities to achieve those objectives), and standards and guidelines, which are used to apply constraints on activities and uses. In the revised plan, the intent of the former standard is addressed through the soils desired conditions, the livestock grazing guidelines, and vegetation objectives for implementing mechanical thinning and fire treatments.*

Comment: Active forest management in key watersheds and riparian reserves should be preceded by and informed by watershed analysis. (CBD-64)

Response: *Agreed. This concern was already addressed. An analysis was conducted in 2010 through the Watershed Condition Framework, which is a national process for improving watershed conditions across the nation. This identified priority watersheds for restoration.*

Comment: Roads contribute more sediment to streams than any other land management activity. Roaded and logged watersheds also feature significantly higher channel bed substrate embeddedness than do undeveloped watersheds. Therefore, the Forest Service should consider an alternative that prohibits new road construction and required road density in each fifth code watershed to less than 2 miles per square mile to prevent catastrophic increases in channel sediment. (CBD-66)

Response: *An alternative was considered, but not analyzed in detail that included a road density standard. It was not analyzed in detail because no issues were raised that would support such an alternative. The Forest Service recently conducted site-specific planning covering all three ranger districts, which closed hundreds of miles of unneeded roads. These decisions considered a range of criteria including potential resource impacts, access needs, as well as public input and alternative views, rather than using an arbitrary road density target. The plan does provide for the protection and management of healthy and sustainable soils and watersheds, which are the primary resource concerns associated with forest roads. If undesirable resource conditions resulted from open roads, they could be addressed through site-specific evaluation and analysis.*

Natural and Constructed Waters

Comment: The EIS should provide an analysis of ecological conditions of rivers, perennial and intermittent streams, wetlands and other aquatic resources. (CBD-15a)

Response: *The EIS water resources section specifically addresses streams, lakes, wetlands, and springs. Additionally, water resources were evaluated in the CER/AMS that served as a basis for identifying the needs for change in the plan. These in-depth reports can be found on the Kaibab NF's plan revision website at http://fs.usda.gov/goto/kaibab/plan_revision.*

Comment: The Forest Service should have standards and guidelines to restore aquatic and riparian habitats. This is prudent and necessary given the perilous state of native fish populations and other aquatic organisms such as the Chiricahua leopard frog. (CBD-62)

Response: *The plan contains desired conditions, objectives, and guidelines for protecting and restoring aquatic habitats in the Wetland/Cienega and Natural Waters sections. Point of information: the Kaibab NF has no populations of Chiricahua leopard frogs or native fish.*

Comment: The plan says it will protect natural waters, but there are no standards and few guidelines for springs, wetlands, and riparian areas to protect these areas. (EBR-17)

Response: *The plan contains guidance for the protection and restoration of natural waters in the desired conditions, objectives, and guidelines for natural waters. These plan components were based on comments received about the proposed action and input from subject matter experts. The development of plan content for springs and wetlands was a collaborative and iterative process involving experts and interested parties. No issues were raised that were not addressed by the action alternatives.*

Comment: The objectives for spring and wetland protection should be more aggressive to protect a minimum of 8 springs per year and at least 75 acres of wetlands per year. (RE-20)

Response: *These objectives were based on levels of implementation within the capacity of the Kaibab NF. There is nothing to prevent the Kaibab NF from exceeding the objective if resources are available.*

Comment: The DEIS states that 167 springs occur on the forest. As many springs in the Kanab Creek have yet to be mapped, this phrase should read that the forest contains 167 known springs. (LS-10)

Response: *We adjusted the language in the FEIS and Soils and Watershed Specialist Report to reflect that the locations and conditions of springs are for known springs only and that there are likely numerous springs yet to be discovered or inventoried on the Kaibab NF.*

Comment: The plan should require that diversions of water that recharge wetlands must be assessed within 5 years and actions taken to eliminate their effects. (RE-21)

Response: *The plan does not include compulsory language as its implementation is subject to fluctuating budgets and changing capacity. Additionally, any "actions to eliminate effects" must be consistent with valid existing rights. The current water diversions on the Kaibab NF are associated with water rights that are outside of the plan revision decision. The plan does, however, include desired conditions and objectives for restoring wetlands. Restoring wetlands was identified as a priority need for change, and wetlands have been and will continue to be evaluated and restored within the capacity of the Kaibab NF.*

Comment: Part of your management strategy for protecting springs is to "do an inventory." The inventory should be done first, and then you should write the standards and guidelines to protect the springs. (EBR-26)

Response: *Resource plan components stipulating the need to conduct resource inventories are outside the scope of the plan. However, an extensive spring inventory and comments and review on the plan components for springs were recently conducted through an agreement with the Museum of Northern Arizona Springs Stewardship Institute. This inventory is already providing information that will improve springs through additional NEPA analysis work (i.e., Kane Ranch Allotments Environmental Assessment).*

Comment: There should be an objective for protecting/restoring Kanab Creek. (LS-21)

Response: *We identified objectives for the highest priority activities that are within the Kaibab NF's anticipated budget over the next 10 to 15 years. Restoring Kanab Creek and the associated cottonwood-willow riparian vegetation communities is recognized as an important restoration need; however, given the Kaibab NF's current capacity and the anticipated restoration needs of Kanab Creek, no specific objectives were developed. The priority needs for change and desired conditions in the plan would support restoration efforts as resources become available. The management approach specifies building capacity to do this work through partnerships.*

Comment: The DEIS states that Kanab Creek has been dewatered and that flooding disturbance has been eliminated. Kanab Creek remains perennial within Kaibab National Forest, as it is fed by several springs (e.g., Mountain Sheep Spring) that emerge in the middle reaches. (LS-8)

Response: Agreed. We modified the FEIS to reflect the perennial flow of Kanab Creek and the important role that spring ecosystems have in contributing to the base flow of Kanab Creek. Additionally, language has been added to reflect that the flooding regime caused by high-intensity, short-duration monsoon storms also contributes to the base flow.

Comment: The management approach for natural waters should remove the text "desired nonnative plants, aquatic, and wildlife species." (SC-54)

Response: *We modified this statement, which is in the desired conditions section. The new language still includes "desired nonnative wildlife," but it has been reorganized to make it apparent that the primary emphasis is on native species. We also added a footnote under desired conditions to define desired nonnative species.*

Wildlife

Comment: The draft plan contains no mention of the requirement to maintain viable populations of fish and wildlife species. (CBD-26)

Response: *The Wildlife Specialist Report describes the legal requirements to maintain viable populations in the introduction section of the report. Further, the plan developed specific components to meet the viability requirement of the NFMA and in the planning rule (36 CFR, part 219.19). There is no requirement for the plan to restate the viability requirement of the CFR.*

Comment: It is difficult to determine from the information provided what species are present on the Kaibab, how they were selected for risk analysis, and how the desired conditions and design criteria presented in the plan may affect vertebrate species or their habitats. (CBD-27)

Response: *The proposed plan and EIS do not individually address all species on the Kaibab NF. However, a species database was developed for the plan revision effort and contains information on all known species likely to occur on the Kaibab NF. A coarse filter was applied to those species whose needs would be accounted for through desired conditions of the broad vegetation types. A second, fine filter was applied to those species with more specific and fine-scale habitat needs that could be impacted by forest management activities; plan components (e.g., standards and guidelines) were added as necessary. The species that went through the fine filter resulted in the "forest planning species" list. The forest planning species list was developed collaboratively by the Kaibab NF, local stakeholders and species area experts, and by consulting with scientific databases such as NatureServe and BISON-M, The Arizona State Wildlife Action Plan (AGFD 2012), the Regional Forester's Sensitive Species list, the U.S. Fish and Wildlife Service (USFWS) threatened, endangered list, and the Museum of Northern Arizona. The process for the coarse and fine-scale process for this selection is discussed in the Species Diversity Report and the Wildlife Specialist Report, which is available on the Kaibab NF website at http://fs.usda.gov/goto/kaibab/plan_revision. Appendix H of the EIS contains a crosswalk between species habitat risk or threats and plan components that will reduce or eliminate the risks.*

Comment: Our native fish are in great peril. Nonnative fish should be removed to improve native fish viability. (SC-53)

Response: *There are no objectives to remove nonnative fish because they are not an issue of the Kaibab NF. A population of "nonnative" but "threatened" Apache trout was introduced to North Canyon Creek in the Saddle Mountain Wilderness, which has no other fish. The plan contains the desired condition that "a reproducing population of Apache trout is maintained in North Canyon Creek." The only other nonnative fish on the Kaibab NF are stocked sport fish in man-made lakes that do not contain native fish.*

Comment: The EIS should provide an analysis of population and habitat trends of threatened, endangered, proposed, sensitive, and management indicator species. (CBD-14)

Response: *Where relevant to the specific effects analysis, population and trend information is summarized in the existing conditions descriptions in the EIS sections that address threatened, endangered, and sensitive species and management indicator species, respectively. More detailed information can be found in the Kaibab NF Management Indicator Species (MIS) Report (2010), Wildlife Specialist Report, Species Diversity Report, and the CER/AMS, all of which are available on the Kaibab NF website at http://fs.usda.gov/goto/kaibab/plan_revision.*

Comment: The Department recommends including a DC or guideline for MIS species specifically in the Plan in the wildlife section. (AGFD-29)

Response: *MIS do not convey a special status; they are selected to assess the effects of management and to help evaluate differences among plan alternatives. The desired conditions for wildlife habitat and species viability are the same for MIS as the other native wildlife species in the plan. Based on the analysis done for the EIS, the revised plan (alternative B) would provide*

improved habitat conditions for all MIS species. No additional guidelines were needed to protect and maintain viability of these species.

Comment: There should be MIS for all ecological types, including riparian and aspen. (EBR-4, EBR-40)

Response: *MIS are selected to help assess the effects of management, and to compare alternatives. There is no legal requirement to select MIS for all ecological types. Aspen and natural waters were, however, selected as ecological indicators to be monitored under the monitoring plan. Ecological indicators differ from MIS in that there is not a specific species population trend that is indicative of management, but rather a suite of parameters that are assessed. See appendix I of the EIS for details about the decision process for selecting MIS and ecological indicators, and how riparian and aspen systems will be monitored.*

Comment: The plan lacks an adequate representation of MIS for several categories: the Kaibab NF must choose MIS that represent the following categories "where appropriate: Endangered and threatened plant and animal species identified on State and Federal lists for the planning area; species with special habitat needs that may be influenced significantly by planned management programs; species commonly hunted, fished, or trapped; non-game species of special interest; and additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality." (NFMA 1982 219.19) The selection of three songbirds and one mammal cannot be construed to span this suite of categories, and the Kaibab NF does not sufficiently justify why they have not chosen more MIS. (SC-2, SC-102)

Response: *The three songbirds and one mammal were selected to evaluate management effects in ponderosa pine, mixed conifer, and grassland habitat. These vegetation types are included under three of the four priority needs for change and have explicit restoration objectives. The 1982 Rule Provisions at section 219.19(a)(1) direct that the categories mentioned above shall be considered (though not necessarily included) for MIS status. MIS are selected to help assess the effects of management and to compare planning alternatives. It is recommended that an adequate but limited number of species be selected to reflect the major management issues and which can serve as effective metrics for monitoring the forest plan. The proposed species will help the Kaibab NF assess management effectiveness in those vegetation types, as described under the MIS analysis section of the EIS (table 18). The proposed species also allowed the Kaibab NF to assess the differing effects among alternatives. Also see appendix I of the EIS, Management Indicator Species Selection, for a detailed account of what species were or were not selected and why.*

Comment: The Kaibab did not select an MIS for stream habitats, even though that habitat contains an endangered species and the Kaibab forest plan (p. 40) acknowledges "Streams, springs, groundwater, and other natural waters are centers of high biological diversity in arid landscapes, and the ecological health of these resources is important for forest ecosystem sustainability." (SC-103)

Response: *There is no requirement to select MIS for all ecological types. MIS are selected to help assess the effects of management and to compare planning alternatives. It is recommended that an adequate but limited number of species be selected as MIS to reflect the major management issues.*

The Kaibab NF's only flowing perennial stream, North Canyon Creek, occurs on the North Kaibab Ranger District within the Saddle Mountain Wilderness. The wilderness management designation limits the amount and type of management activities that could be applied to this area. Because there is no difference among the action alternatives for wilderness management, an MIS would not be necessary for comparing planning alternatives. Rather than select an MIS with an area of inference restricted to the Kaibab NF's one flowing perennial stream, natural waters (which include streams) will be assessed by monitoring a suite of ecological parameters that are found under the monitoring plan for natural waters and soils and watersheds.

Beyond monitoring, the revised plan identifies desired conditions, objectives, and guidelines that will help to ensure habitat integrity is maintained in the Kaibab NF's stream habitat as well as for all of its natural waters. These plan components can be found in appendix H of the EIS and under the Natural Waters, Wilderness, Vegetation Management in all Forested Communities, Large Scale Disturbances in Forested and Woodland Communities, and Threatened, Endangered and Sensitive Species sections of the plan.

Comment: Due to the importance of small mammals to the northern goshawk and Mexican spotted owl, the forest should include small mammals as MIS including, but not limited to squirrels, gophers, mice, and prairie dogs. (RE-9) The northern goshawk and Kaibab squirrel do not have the protection and status they had in the previous plan (LS-3). The Forest Service should retain the tassel-eared squirrel as a management indicator species, tassel-eared squirrels are an indicator of interlocking canopies. (WILD-7) The Forest Service should retain the tassel-eared squirrel as an MIS because they are highly associated with interlocking ponderosa pine canopies and are sensitive to management practices. (SC-106a)

Response: *MIS do not convey a special status; they are selected to assess the effects of management and to help evaluate differences among plan alternatives. Small mammals were not selected as MIS because they have a tremendous amount of interannual variation in their population levels, making it difficult to reliably estimate trends and relate those trends to management effects. The Kaibab NF continues to manage for healthy robust populations of tassel-eared squirrels and northern goshawk through the desired conditions and guidelines in the plan. The northern goshawk continues to be a Forest Service sensitive species and would be analyzed at the project level to help maintain viability of the species. The Kaibab squirrel (tassel-eared squirrel subspecies) has additional protection under the National Natural Landmark section of the plan. Finally, we believe the best indicator for interlocking canopies are the canopies themselves, which are addressed though the monitoring plan. See appendix I of the EIS, Management Indicator Species Selection, for a detailed account of what species were or were not selected and why.*

Comment: The existing standards and guidelines and best management practices, even if fully funded, are inadequate to meet statutory and regulatory requirements to provide for viable fish and wildlife populations that depend on aquatic habitats. (CBD-65)

Response: *We developed plan content for aquatic habitats to meet the statutory and regulatory requirements and to address the issues that were raised during scoping and collaborative processes. Fish and wildlife populations that depend on aquatic habitat are provided for in the plan under the desired conditions, standards, and guidelines for wetland cienegas, cottonwood-willow riparian, natural and constructed waters, soils and watersheds, wildlife, threatened,*

endangered, and sensitive species. The viability analyses showed that those species depending on aquatic habitats would be provided for.

Comment: The use of PNVT as a proxy for viability is subject to significant scientific uncertainty and the habitat-proxy approach to managing target species has rarely been tested in any context. (CBD-29, CBD-30). The factual presentation of the habitat-proxy approach lacks basic information about what species exist, what their habitat requirements are, or how management might affect their recovery or viability. (CBD-33)

Response: *The coarse filter, fine filter concept for conserving biological diversity is a well-developed concept in scientific literature that incorporates biological and conservation science advances of the past three decades (Noss 1987, Haufler et al. 1996, Iverson, 2001, Shulte et al. 2006, Zenner et al. 2010). The coarse filter, fine filter approach does not assume that PNVTs are a proxy for viability, nor is the viability analysis process a habitat proxy. The coarse filter looks at the plan components that provide for the ecosystem needs of the species. Species at risk are assessed against these coarse filter plan components, and where those approaches fail to provide a high likelihood of maintaining ecological conditions to support viable populations, fine filter (species-specific) plan components or strategies must be developed. The list of 68 forest planning species analyzed, their habitat requirements, and potential management effects on recovery or viability, or both are discussed in the species viability section of the EIS.*

Comment: Isolated pockets of large trees would not meet the needs of canopy dependent species. (SC-20)

Response: *The fine-scale desired conditions provide for mature trees with interlocking crowns consistent with the historic reference conditions, not isolated pockets. These conditions provide for those species that naturally occurred and evolved in these systems, see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013.*

There are many species with different canopy-related habitat needs, life history strategies, and behavioral adaptations. The list of 69 forest planning species includes canopy-dependent wildlife species such as birds, reptiles, amphibians), and small mammals. The forest plan addresses canopy-dependent wildlife species needs through the following wildlife desired condition: "Species with specific habitat needs (e.g., snags, logs, large trees, interlocking canopy, and cavities) are provided for."

Additional plan components that will provide for canopy-dependent species can be found in appendix H of the EIS under multilayered canopy, interlocking canopy, and old growth. The species viability analysis in the EIS also addresses the needs of species associated with canopy cover; see discussion for federally listed and sensitive species of the FEIS, and in the management indicator species analyses for Grace's warbler, western bluebird, and ruby-crowned kinglet.

Comment: If structural stages and the associated canopy densities are measured at the group level, then species with contiguous canopy requirements will lose habitat. (SC-74)

Response: *The plan does not specify how canopy cover is measured. Species with shade and closed-canopy needs were addressed through the coarse filter, /fine filter process used to develop plan components. The viability analysis in the FEIS assures canopy-dependent species needs are*

met (see appendix H for list of canopy-dependent species and associated plan components that mitigate potential management risk).

Comment: Tassel-eared squirrels should be monitored to increase our knowledge of the state of this species, rather than assume a resilience that has not been demonstrated. (SC-106b)

Response: *We do not have a monitoring question in the plan to specifically monitor tassel-eared squirrels. Monitoring plan questions try to address those key habitat components likely to affect numerous species, and to assess movement (progress) toward desired conditions. Monitoring plan questions were developed to address those areas of greatest concern, and for which the Kaibab NF could collect adequate monitoring data within existing funding levels.*

Comment: Table B-20 of the DEIS indicates that that the amount of pine oak habitat would increase under the proposed action, but there is no indication of where this would come from. (DOI-23)

Response: *The amount of a PNVT does not change, but the VDDT states correlate to quality habitat. As the vegetation objectives are implemented over time, the amount of quality habitat is expected to increase. This is articulated in appendix B of the EIS in the wildlife section.*

Comment: The current plan has quantified standards for snags, but the proposed plan only says some snags "should be retained." This change should be analyzed in the EIS. (EBR-15)

Response: *Snags were analyzed as a habitat element in the wildlife viability section of the EIS. Rather than standards which specify snag levels, the proposed plan identifies snag levels as desired conditions under many of the vegetation types. For example, the Vegetation Midscale Desired Condition for Ponderosa Pine specifies: "snags 18 inches d.b.h. or greater average 1 to 2 snags per acre, and in frequent fire mixed conifer they "average 3 per acre." Snags and green snags of variable size and form are common." The monitoring plan then identifies the following question to ensure that the appropriate snag levels are maintained for those vegetation types: "Are snags, coarse woody debris, downed logs and large old trees at desired levels at the midscale (100 to 1,000 per acre average)?" The guideline "snags should be retained" was modified in the revised plan under Vegetation Management in All Forested Communities and now states that project design and treatment prescriptions should generally "not remove" snags.*

Comment: The DEIS (p. 105) asserts that according to the VDDT modeling, in 15 years under alternative B, goshawk habitat would increase by 48,673 acres and frequent-fire mixed conifer would increase by 5,350 acres, but does not specify what structural characteristics it is managing for that would achieve this difference. (SC-79)

Response: *The EIS used the VDDT model to help determine how nesting and roosting habitat, could change over time with each alternative. The VDDT states do correlate to quality habitat and structural characteristics, as specified in appendix B (table B-14) of the EIS under the wildlife section. For goshawks, the structural characteristics of the VDDT states correspond to include large trees in multistory stands with both open and closed canopy. This equates to acres of nesting, and roosting habitat.*

Comment: The plan fails to adequately protect the remaining old growth ponderosa pines and mixed-conifer and virtually ensures the further decline of species such as the northern goshawk. (SC-1)

Response: *The needs of the northern goshawk were addressed in the regionally consistent desired conditions and guidelines (see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013). The viability analysis in the EIS assessed the risk to the northern goshawk and its habitat. The plan desired conditions provides for old-growth ponderosa pine and mixed conifer forest structural stages as a component of the uneven-aged forest, similar to historic natural conditions at all scales. In addition, the guidelines under threatened, endangered, and sensitive species reinforce retention management of known goshawk nesting areas for quality nesting habitat attributes.*

Comment: Canopy cover maintained at the clump and group scales has the potential to reduce the amount of forest cover at the stand scale that is needed for goshawk nesting and fledging habitat. (CBD-50) The Forest Service should not drop the standards related to goshawk nest areas, PFAs and foraging areas. Removing standards will ensure that the goshawk becomes more rare and uncommon. (SC-70)

Response: *The needs for the goshawk were considered and provided for at all three scales of the vegetation desired conditions in ponderosa pine and mix conifer stands (Reynolds et al. 2013.)*

Alternative A would maintain the standards and guidelines of the current plan. The action alternatives reformat a number of standards and guidelines in the current plan into desired conditions in a way that removes difficulties that have become apparent with implementing the current standards and guidelines. Application of stand-scale canopy cover measures conflicts with management for uneven-aged stand conditions, and is inconsistent with current science relative to the ecology of these forests. Managing for stand-scale closed-canopy forest conditions is also inconsistent with the habitat needs of other wildlife species, some of which are primary components of the goshawk food web. Beside the Reynolds et al. (2013) GTR, how goshawk habitat components are provided for under the revised plan is reflected in appendix M. There are desired conditions and guidelines in the Threatened, Endangered and Sensitive Species section of the revised plan that directly address nesting and PFAs for the goshawk. A viability risk assessment by alternative was carried out in the EIS for several habitat components important to the goshawk and viability was assured. Alternative A has the highest risk. Overall, the greatest risk to goshawk habitat identified in the EIS was loss of habitat due to uncharacteristic fire.

Comment: More science is needed to determine which management practices actually benefit the goshawk. (SC-105a)

Response: *There is no NEPA or CEQ requirement that decisions must wait for more research and data. We used the best available science related to goshawk habitat to develop the plan components (see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013). The desired conditions focus on managing for forest vegetation conditions that reflect the local evolutionary environment of the goshawk and its food web. Assessing specific effects of management practices on the goshawk is a research question and is outside the scope of the plan and EIS. However, research on goshawks continues to occur outside the planning process and, in time, this information can be incorporated into management practices. The Kaibab NF is committed to integrating best science into its management decisions.*

Comment: The DEIS states that conservation of wildlife in a changing environment was "not easily implemented under the current plan, but fails to explain why. (CBD-36)

Response: *The DEIS stated in Environmental Consequences for Wildlife Species Viability: Alternative A – Current Plan, Current Management (No Action) the following: "The current plan has very prescriptive (restrictive) standards and guidelines that make it difficult to apply adaptive management based on our understanding about management effects on ecosystems and wildlife. Adaptive management will be essential to effectively manage for climate change and invasive species in changing and uncertain conditions." In response to this comment, clarification was added that "As a result the action alternatives include a monitoring plan designed to better inform the effects and effectiveness of management and progress towards desired conditions." In the DEIS, the next paragraph goes on to further explain that "Climate change has the potential to affect all wildlife species, and influences the likelihood of large-scale disturbance (e.g., fire, bark beetle outbreaks) across the landscape. The original forest plan (alternative A) does not recognize climate change, and offers limited guidance associated with management activities (e.g., salvage logging) related to such disturbance events."*

Comment: Goshawks should be closely monitored to determine what its population trajectories are and its condition should be used to assess forest conditions. (SC-105b)

Response: *Although goshawks are not specifically called out in the monitoring plan, forest conditions for the goshawk are assessed in the monitoring matrix (table 5) of the revised plan. The monitoring questions for ponderosa pine and frequent-fire mixed conifer assess desired conditions in the plan, which should benefit goshawk and the necessary forest conditions. The relevant monitoring questions are: "How many acres of the Kaibab NF are in an uneven-aged open state, at the mid-scale (above 100 acres)?" and "What is the total area within the desired range for basal area and openings?"*

While not directed by the plan, the Forest Service does monitor goshawks at different spatial scales. Region 3 is currently monitoring the goshawk populations across the Colorado Plateau. Surveys are completed about every 5 years. Additionally, the Kaibab NF has baseline occupancy (presence/absence) data (Dickson et al. 2013.).We intend to re-measure on a regular interval, which will allow us to determine changes in habitat use over time and infer projects' effects and other environmental influences. Results from some of this work are available on the Kaibab NF website: http://fs.usda.gov/goto/kaibab/plan_revision. See "Best Use of Science" link.

Comment: We suggest incorporating additional research models and findings relevant to goshawk management. (WILD-10)

Response: *The proposed plan and the regionally consistent desired conditions were developed using a variety of existing peer-reviewed research and findings (see appendix J of the EIS, and the Desired Condition White Paper; Desired Conditions for Use in Forest Planning in the Southwestern region: Development and Science Basis Updated: August 2013). The Kaibab NF is committed to integrating best science into its management decisions.*

Comment: Tassel-eared squirrels need patches of old or mature ponderosa pine trees. (WILD-8a)

Response: *This need is addressed through the desired conditions for ponderosa pine in the plan. There is a fine-scale desired condition that states "Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group." The mid-scale desired conditions provide for a distribution of mature and old trees through the desired condition that says "all age classes and structural stages are present."*

Comment: The Kaibab squirrel is not "readily adaptable to a wide variety of habitats" as asserted in the DEIS (appendix I). In fact, the Kaibab squirrel is considered to be vulnerable to extirpation or extinction globally, nationally, and statewide by NatureServe (2001). (WILD-8b)

Response: *The statement "readily adaptable to a wide variety of habitats" refers to the cottontail rabbit, which is immediately below Abert's squirrel (tassel-eared squirrel) in table I-2 in appendix I. Kaibab squirrels (tassel-eared squirrel subspecies) are found throughout their habitat on the Kaibab NF. The NatureServe ranking of S3 is due to the limited range and distribution of this endemic species.*

Comment: We recommend that hunting of tassel-eared squirrels not be allowed. (WILD-9) For pronghorn, there should be a desired condition for achieving at least 40 fawns per 100 does as a goal to expand the existing populations. (RE-11)

Response: *Arizona Game and Fish is the lead agency responsible for managing wildlife populations, and for making decisions about hunting and hunted species in Arizona. The Forest Service does not set goals for game species populations. This is outside the scope of the plan decision.*

Comment: Please include a guideline which recommends moving fences back from roadways to facilitate pronghorn crossing. (AGFD-30)

Response: *While we recognize the value for fence setbacks for pronghorn antelope, we did not include the suggested guideline. Decisions to relocate fences needs to be made at the project-level because there are many conditions that need to be evaluated such as easements, rights-of-way, and effects to permittees.*

Comment: Spatial and temporal connectivity within and between watersheds is necessary for maintaining aquatic and ecosystem function. Connections among basins must allow for movement between refugia. (CBD-63)

Response: *While it is desirable for there to be wildlife connectivity and human-caused habitat fragmentation to be minimized, in some cases (springs) aquatic function is better protected by maintaining its isolation (L. Stevens, pers. comm.). As a result, no additional plan components were developed to address this concern.*

Comment: The EIS should provide an analysis of the implications for the viability and recovery of aquatic associated fish and wildlife species, particularly fish and amphibians. (CBD-24)

Response: *The wildlife section of the EIS contains a viability analysis for at-risk aquatic species including the northern leopard frog, spikedace, loach minnow, and Apache trout. Additional supporting information about aquatic resources can be found in the spring assessment database and species database in the project record.*

Comment: In the guidelines for wildlife management, please include the Department's State Wildlife Action Plan Species of Greatest Conservation Need in bullet 2. (AGFD-28)

Response: *As a general note, due to format changes between draft and final, the comment now refers to bullet 2 in guidelines for threatened, endangered and sensitive species. The plan includes language about working with AGFD to achieve management goals and objectives specified in Arizona's State Wildlife Action Plan in the wildlife management approach section.*

The management approach section is the most appropriate part of the forest plan for acknowledging how we will be working with partners.

Comment: Bison hybrids and Rocky Mountain elk are both nonnative and their continued presence could take a heavy toll on forest resources. Management direction is needed for these species to minimize their impacts. Coordination is needed with neighboring Federal land managers (i.e., Grand Canyon National Park) to ensure that these nonnative wildlife species do not harm forest resources, or those on adjacent Federal lands. Bison (cattalo) should be addressed as an invasive species. They do not naturally occur on the Kaibab; they are probably multiplying rapidly and should be eliminated. (GR-1)

Response: *The following guideline was added to the plan to minimize the impacts from bison: "the bison should be managed so that the herd is concentrated within the House Rock Wildlife Area. Active management should be used to minimize impacts from bison to sensitive resources, particularly outside the House Rock Wildlife Area." The following desired condition was modified to further address this concern: "The bison herd size is in balance with ecological conditions in the House Rock Wildlife Area." Specifically for bison, the following language has also been added to the plan management approach: "Efforts to achieve the desired conditions will likely be implemented in phases with an initial emphasis on reducing the herd size and excluding them from Grand Canyon National Park. Strategies may include hunting and trapping, fencing, and herding." Point of clarification: The IUCN/SSC Bison Specialist Group has documented that the Kaibab NF is within the historic range of bison and that they are considered native to this area (Potter et al. 2010). While history of the herd that was re-introduced to the Grand Canyon Preserve in 1906 has shown the introduction of cattle genes to the herd, the AGFD has determined that this is a wildlife herd, and therefore, is treated as such. Most bison herds within the United States outside of conservation herds have a certain level of cattle genes present. Bison on the Kaibab NF are considered native wildlife.*

Plan direction that would minimize the impacts from elk can be found in the plan under Aspen and Constructed Waters. For example, the plan contains an objective to fence 200 acres of aspen on the Williams and Tusayan Ranger Districts within 10 years of plan approval, and a desired condition that constructed waters do not concentrate ungulate activity in aspen stands.

As mentioned in the aspen sections of the plan, the Kaibab NF is committed to working with its partners to find achievable management strategies that balance the needs of the ecosystem with desired nonnative species such as elk.

Comment: The plan should have direction that would prevent the further introduction of nonnative species by the AGFD. (GR-2)

Response: *We evaluate species introduction proposals on a case-by-case basis according to Forest Service policy. If the AGFD should recommend introducing a species, we would follow the Forest Service policy to evaluate the potential effects and relative trade-offs before making a decision. This is outside the scope of the forest plan decision.*

Comment: Please clarify what is meant by "selected nonnative species." (SC-51)

Response: *We changed the natural waters desired condition from "select nonnative species" to "desired nonnative species" and added a footnote to clarify that desired nonnatives are those with high social or economic value. On the Kaibab NF, there are some desired nonnative species*

such as Apache trout and Rocky Mountain elk. While some people have called bison a nonnative species, current research shows that the Kaibab NF is within the historic range of the bison and they were native to this area (Potter et al. 2010).

Comment: The dwarf shrew and spotted skippering are essentially written off in the DEIS (p. 87). (LS-2, WILD-13)

Response: *Little is known about these species. The Kaibab NF supports efforts and works with partners to increase knowledge about these species. Until more information is available, the plan accommodates these species by providing overall habitat and incorporating design features to provide for them as recommended in the Kaibab NF's rare and endemic guidebook.*

Comment: The plan does not address extirpated species such as the grey wolf and pileated woodpecker (LS-1, WILD12). The forest plan should consider reintroduction of extirpated species, thereby enabling the first steps in the reintroduction process (SC-109).

Response: *The reintroduction of extirpated species is outside the scope of the plan decision. This is described in the introduction to the plan's wildlife section, which states "the Kaibab NF is primarily responsible for providing habitat to maintain species diversity on the forest...." "The AGFD and the U.S. Fish and Wildlife Service are the lead agencies responsible for managing wildlife populations in Arizona." The plan would, however, support such an effort if and when the AGFD or USFWS initiated a reintroduction effort. The Wildlife Management Approach section of the plan states that "the Forest Service cooperates with State, Federal, and nongovernmental organizations to reestablish naturally occurring species." The plan also has a desired condition that "native species occur throughout their potential natural range."*

Comment: The plan contains an objective to modify and or install pronghorn crossings on 50 miles of fence in a 10-year period (5 miles per year). How many miles of fence need to be maintained? Is this enough? (SC-38)

Response: *Many of the fences in priority habitat (e.g. fawning areas and migration corridors) have already been modified. We will continue to focus on areas where there is greatest need. The objective was not based on the total need, but what we believe we have the capacity to accomplish over the next 10 years.*

Threatened, Endangered, and Sensitive Species

Comment: The Forest Service fails to explain why it seeks to repeal standards for wildlife habitat management. (CBD-35) The DEIS fails to disclose the negative effects to listed and sensitive species that would result from the removal of binding standards for wildlife. (CBD-37)

Response: *The viability analysis in the EIS assesses the habitat needs for the 69 forest planning species, which includes listed and sensitive species. This analysis demonstrated that the preferred alternative had the least viability risk of all alternatives, including the current plan.*

Each standard and guideline from the original plan (as amended) was evaluated, and those that were not needed were not retained. Standards or guidelines were not retained if they were already addressed by law, regulation, or policy, outside the management control of the Forest Service, or were restrictive or prescriptive guidelines and not based on the best available science. The EIS

appendix M further describes how existing standards and guidelines for wildlife habitat management were incorporated into the revised plan.

Most of the standards and guidelines that have the potential to benefit wildlife in the current plan are also found in the action alternatives in the form of desired conditions, guidelines, or management approaches. For example, specific guidance from approved recovery plans is not repeated verbatim in the plan, but is instead incorporated by reference under the guidelines for threatened, endangered, and sensitive species, which state "project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans." This approach will help keep the plan current and in line with the best available science. Additional direction for wildlife also resides with many of the vegetation types where those species live, or with activities that might affect them. For example, guidance for certain listed and sensitive species can be found under the desired conditions for ponderosa pine and frequent-fire mixed conifer, and there are numerous guidelines under vegetation management in all forested communities. See the introduction chapter of the revised plan for a discussion on plan components and how standards and guidelines differ and the Wildlife Species Viability: Effects Common to All Action Alternatives section of the EIS for further discussion of the effects of the action alternatives on wildlife species viability.

Comment: The Forest Service should avoid grouping threatened, endangered, sensitive, and indicator species with more common species because species with more restrictive ranges are less likely to be protected by management of habitat at taxonomic scales than widespread species. (CBD-31, CBD-32)

Response*: The coarse filter analysis did group more and less common species, but by threat to habitat not by range. The fine filter analysis further identified specific threats within those habitats. By using this approach, we were able to identify and develop additional plan components where needed to provide for viability. This process is described in detail in the Species Diversity Report (2008) and in the Wildlife Specialist Report. The EIS does analyze threatened, endangered, and sensitive species separately for each alternative and the MIS are discussed in their own section.*

Comment: Page 70 of the DEIS should either delete the vegetation types from this table or be more specific about the aspects of habitat that are important. (DOI-17)

Response: *The vegetation types were listed in table 11 of the Species Viability wildlife section to show how much potential habitat each species occupies. This table provides a baseline for potential and occupied habitat, and is fundamental to the subsequent analyses. This table was set up to show the primary habitat types important for each species; it was not intended to provide specific aspects of habitat.*

Comment: Even if the guidelines in the revised plan were required, the direction would not ensure viability of the goshawk or its 14 prey species. (CBD-51)

Response: *The plan does not rely on guidelines alone to ensure viability for the goshawk and its prey. In addition to the guidelines, viability is provided through the vegetation desired conditions and objectives. The FEIS analyzed the revised plan and alternatives and determined that the revised plan has the greatest ability to provide for the goshawk over time and provides for the*

goshawk viability from forest management activities. None of the 14 prey species where shown to have viability issues resulting from implementation of the revised plan. The intent of guidelines must be followed or a plan amendment is needed. Objectives are concise projections of measurable, time specific intended outcomes. Objectives have been established for the work considered most important to address the needs for change and achieve desired conditions. Projects are required to maintain or move toward desired conditions and to be consistent with the plan over the long term. Collectively, these plan components provide for viability of the goshawk and its prey.

Comment: Designation of protected and restricted areas and implementation of the standards and guidelines in the 1996 Record of Decision is the minimum required to support a no jeopardy call on the revised plan. (CBD-46)

Response: *The no jeopardy call for the 1996 Record of Decision was based on the original forest plan, as amended. The USFWS has reviewed the revised plan and issued a new biological opinion (September10, 2013) that reflects the provisions in the revised forest plan, the revised recovery plan for the Mexican spotted owl (FWS 2012), and new information that has become available during the past 15 years. A no jeopardy call was issued in the new biological opinion.*

Comment: We recommend designing any timber harvest, thinning, or fire treatments in the watershed(s) supporting North Canyon Creek in a manner that enhances and protects Apache trout habitat. In the watersheds that include and drain into North Canyon Creek, we recommend designing fire treatments in a manner that will result in low intensity surface fire with minimal torching. (DOI-8)

Response: *No plan components were developed to direct timber harvest or thinning activities in the North Canyon watershed because most of this area is within the Saddle Mountain Wilderness, which would not support timber harvests or mechanical thinning activities. Any planned activities in the area that may affect the Apache Trout would be coordinated with the USFWS. Additionally, there is a wildfire management standard that states "Managers will use a decision support process to guide and document wildfire management decisions." Additionally, there is a guideline that protection objectives should be developed "if current or anticipated fire behavior and fire effects exceed the desired fire behavior and effects." The designing of any treatment that affects North Canyon would be at the project level.*

Comment: To ensure the viability of California condors, the Forest Service should consider an alternative to require the use of lead-free ammunition. Lead shot is not only the primary killer of California condors in Arizona; it also harms a suite of raptors and other scavengers and is harmful to humans who consume contaminated meat. The Forest Service should use its authority to protect all species in the forest by banning lead ammunition. (SC-107, TS-2)

Response: *While we acknowledge the harmful effects of lead to condors and other raptors, the FEIS fully evaluated and disclosed the effects of lead ammunition on condors and the decision not to include a ban or limitation is supported by documentation in the project record. If deemed necessary or appropriate, the use of lead ammunition could be prohibited through the rule-making procedures established in 5 U.S.C. 553, or may be limited using other legal mechanisms depending upon the scope and scale of the limitation.*

Comment: The agency is in violation of the endangered species act by failing to regulate use of lead ammunition by hunters on the Kaibab National Forest and the Draft Plan would similarly violate the ESA prohibition on unlawful take of the species. (CBD-59)

Response: *The regional forester has the authority to prohibit actions on the forest for the purposes of protection of endangered species per 36 CFR 261.70. If deemed appropriate, the use of lead ammunition in a national forest could be prohibited by following the rule making procedures established in 5 U.S.C. 553 or may be limited using other legal mechanisms depending upon the scope and scale of the limitation. Additional protections for the condor are not needed for the purposes of the forest plan. Under all plan alternatives, the viability of the California condor from forest management activities is maintained, as documented in the viability analysis in chapter 3. The Kaibab NF did consult with the USFWS on the plan, and no take was issued for the condor.*

Comment: Due primarily to issues from exposure to lead ammunition, the condor population is currently maintained through release of captive-bred birds, and is not likely to become self-sustaining unless further lead reduction efforts are taken but the DEIS identified the viability risk as "low." (DOI-11)

Response: *As noted in the FEIS discussion for the Species Viability Analysis, the viability ratings are based only on the habitat elements and the potential to be affected by Forest Service management action (or inaction).. Other factors that could affect species are not included (e.g., disturbance during the breeding season). The FEIS states that there is a moderate viability risk to the condor within the habitat element rocky outcropping, caves and cliffs. This ranking is based on the combination of forest ranking for the condor and rating of the likelihood that habitat would be a limiting factor. The EIS was clarified to state that while cumulatively there is a negative effect to the Southwest population from lead shot, the Kaibab NF management activities would not adversely affect the viability of the species. The EIS recognizes that all species listed as endangered have an inherent viability risk.*

Comment: The DEIS should clarify that the California condor is a federally listed species under the Endangered Species Act, and only for purposes of section 7 consultation within the 10 (j) population area are they treated as proposed. (DOI-20)

Response: *We added language to the FEIS to ensure that this is clear.*

Comment: The Kaibab has the authority to prohibit the use of lead ammunition and should do so to prevent this risk to condor viability. (WILD-18, TS-1)

Response: *The regional forester has the authority to prohibit actions on the Kaibab NF for the purpose of protecting endangered species per 36 CFR 261.70. If deemed appropriate, the use of lead ammunition in a national forest could be prohibited by following the rule making procedures established in 5 U.S.C. 553 or may be limited using other legal mechanisms depending upon the scope and scale of the limitation.*

Comment: The EIS minimizes the threat to condor viability and states that it does not regulate hunting, it "only provides access to hunting," but the Forest Service issues commercial big game permits that do not require non-lead ammunition. (WILD-19)

Response: *The Forest Service does not issue commercial big game permits; it issues permits to State-licensed outfitter-guide businesses to provide assistance to hunters. Permitted guides are hired to track game, maintain camp, and to provide other support services, but they do not direct or control the hunting activities of their customers. As a result, hunting regulation is not within the Forest Service's authority. Permitted guides are required to encourage their clients to use non-lead ammunition or pack out gut piles.*

Comment: The plan would remove standards and guidelines that limit the development of utility corridors in condor habitat. (CBD-3)

Response: *There are standards and guidelines that limit the development of utility corridors in the plan (See appendix M). The only standards that were removed reiterated guidance found in Forest Service handbooks and manuals.*

Comment: The DEIS should specify that the first successful condor nesting attempt occurred in 2011, an unsuccessful attempt occurred in 2010. (DOI-22)

Response: *We adjusted wording in the FEIS to reflect this.*

Comment: If forest management practices or other activities managed by the Kaibab NF may affect habitat for the spikedace or loach minnow, a description of these activities and potential effects should be disclosed. (DOI-19)

Response: *The nearest populations of loach minnow and spikedace are 12 miles from the Kaibab NF boundary. The potential for off-forest effects to these species from management activities is low. The greatest risk to these species from Kaibab NF lands is large-scale, uncharacteristic, high-severity fire and the associated downstream effects. The potential effects were discussed in the DEIS. The FEIS will provide greater clarification and detail.*

Comment: Mixed conifer will continue to have issues due to U.S. Fish and Wildlife Service's preoccupation with critical habitat designations for nonexistent populations of Mexican spotted owls on the North Kaibab Ranger District. (KCC -6)

Response*: The Kaibab NF will continue to work closely with the USFWS to provide quality habitat for the Mexican spotted owl. We believe there is flexibility to provide both for the Mexican spotted owl and to restore desired conditions.*

Comment: The plan and DEIS should recommend restating that following the Mexican Spotted Owl Recovery Plan is an objective for each alternative. (DOI-14)

Response: *The guideline "project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans" is common to all action alternatives and applies to all approved recovery plans. There is no need to restate it for each species and alternative. Additionally, the management approach sections of the vegetation types that support Mexican spotted owl habitat specifically reference the Mexican Spotted Owl Recovery Plan.*

Comment: All guidelines in the plan can be changed in project-level decision for any reason, this would allow the agency to design projects unencumbered by binding direction that would prevent adverse effects to the spotted owl and its critical habitat. (CBD-48)

Response: This assertion is not true. *All projects and activities must meet the intent of plan guidelines, or plan amendments are required. Further, the plan, the biological opinion for the plan, recovery plans, and project specific consultations, all provide protections for T&E species. The plan contains a guideline that "project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans." The Kaibab NF also follows the terms and conditions in the biological opinion for the forest plan. Additionally, the Kaibab NF consults with USFWS to minimize potential adverse effects on all projects that may affect the MSO and its habitat. .*

Comment: It is unclear how the draft plan desired conditions would provide for nesting and roosting habitat for Mexican spotted owls. (DOI-1)

Response: *We added language to the fine-scale desired conditions to better align with the language in the Mexican Spotted Owl Recovery Plan that "where Gambel oak comprises more than 10 percent of the basal area, it is not uncommon for canopy cover to be greater than 40 percent," and that in frequent-fire mixed conifer forest, canopy cover may be very closed at the fine scale.*

Comment: The DEIS and plan should discuss how protection of Mexican spotted owl protected activity centers (PACs) will be balanced with this experimental approach. (SC-27)

Response: *The experimental approach specified in the guideline for vegetation management activities in mixed conifer is consistent with the direction in the revised recovery plan (FWS 2012) that supports adaptive learning. The specifics of implementation would consider site-specific information and would involve the USFWS in developing project design criteria and associated monitoring related to Mexican spotted owl PACs.*

Comment: The draft plan proposes no affirmative survey requirement for Mexican spotted owls and as a result would only protect known PACs. (CBD-47)

Response: *While the plan does not directly have a survey requirement for Mexican spotted owls, the plan contains a guideline that states "project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans." The revised recovery plan (2012) specifies that surveys should be done prior to activities that may alter potential owl habitat. The reasonable and prudent measures in the biological opinion call for survey, and the forest consults with the USFWS on all Federal actions that may affect the Mexican spotted owl or its critical habitat. The revised recovery plan for the Mexican spotted owl details a new sampling framework that is at a scale that is biologically meaningful for the owl. This necessarily crosses large landscapes and land jurisdictions and is stratified by ecological management units. Implementing this survey design is beyond the scope of the plan and EIS. However, the Forest Service will be meeting with the USFWS and other land management agencies to discuss strategies for implementing this new sampling framework. The surveys should yield data on population and habitat trends. The Kaibab NF is part of this bigger sampling framework and design, which must be integrated consistently by all parties if the results are to yield statistically sound data which can be applied toward down listing of the species.*

Comment: The plan eliminated standards and guidelines related to the Mexican spotted owl, and replaced them with a reference to the recovery plan. The recovery plan is not enforceable in site-specific project implementation and will not ensure species viability or avoid jeopardy. (CBD-45)

If consultation for the Mexican spotted owl is deferred to site-specific proposed actions or if the revised plan fails to implement the recovery plan (as opposed to just referencing it) the Mexican spotted owl and its habitat may be jeopardized. (CBD-58)

Response: *The Kaibab NF follows the intent of Mexican Spotted Owl Recovery Plan and the provisions in the Endangered Species Act. The revised forest plan does not reiterate law, regulation, or policy, but instead points to it. This enables the plan to remain current by incorporating higher level policy by reference. Additionally, the Kaibab NF consults with the USFWS on the forest plan as well as on site-specific projects that may affect the Mexican spotted owl or its habitat. Project design and site-specific mitigation measures are developed to provide for the owl to prevent jeopardy.*

Comment: The similarity of desired conditions between ponderosa pine and dry mixed conifer could lead to type conversion of mixed conifer over time. There should be language that specifies post-treatment conditions should not be dominated by ponderosa pine. (AGFD-9) There needs to be more clarification about how meeting the objectives for reduced tree density and increased openness would be applied so that they do not degrade or create a type conversion in Mexican spotted owl habitat. The DEIS should describe whether and how type conversions would occur and the effects of such conversions on listed species. (DOI-15, DOI-24)

Response: *By definition, the frequent-fire mixed conifer type historically had a plurality of, but was not dominated by ponderosa pine. The guideline to "retain at least historic frequencies of trees by species across broad age and diameter classes" is intended to make progress toward the desired conditions for each forest type and prevent type conversion. The Kaibab NF does not consider restoration toward the historic condition where ponderosa pine has a plurality a "type conversion." The species composition objective for frequent fire forest types is to manage for a plurality of species that are fire-resistant, consistent with the desire to restore essential ecosystem processes such as frequent surface fire. Managing for a plurality of species that are not fire resistant would maintain or develop unsustainable conditions that are inconsistent with natural processes."*

Comment: Condors are also a federally listed endangered species; the Forest Service also has a responsibility under the Endangered Species Act to promote recovery of this species. (SC-108) We recommend including more specific guidelines for management and protection of Mexican spotted owls and other listed species on the Kaibab NF, under the "Guidelines of Wildlife Management" and within desired condition objectives, in order to incorporate section 7(a)(1) recovery responsibilities. (DOI-7)

Response: *The plan meets the section 7(a)(1) responsibilities by providing for key habitat components and guidance for activities that affect all listed species including the condor and Mexican spotted owl. These provisions are integrated throughout the plan in the form of desired conditions, objectives, and guidelines. In addition to providing for quality habitat, the plan emphasizes educational outreach, which is an important medium for communicating the benefits of good stewardship practices to the public and can be a major instrument through which long-term conservation change may be achieved. These long-term conservation activities should help promote recovery of the condor. In response to this comment and to continue the promotion of reducing the effect of lead on the condor, the recreation desired condition for public education was supplemented to better reflect the Kaibab NF's 7 (a)(1)responsibilities. It now reads "Visitors have access to information that enriches their recreation experiences and contributes to an*

*understanding of their role in public land stewardship. "Leave No Trace," "Tread Lightly," fire prevention, **wildlife awareness (e.g., lead reduction**, Bear Aware, Animal Inn, etc.), and archaeological resource protection principles are promoted and practiced by the visiting public." The words "wildlife awareness (e.g., lead reduction)" are bolded to highlight the language that what was added to the desired condition to help meet the 7(a)(1) responsibilities.*

Comment: Recommend that Mexican spotted owl habitat (pine-oak and mixed conifer), as defined in the Mexican Spotted Owl Recovery Plan, be identified. (DOI-12)

***Response:** We added language to the introduction of the ponderosa pine PNVT to better highlight the pine-oak subtype. It now reads "The ponderosa pine forest vegetation community includes two subtypes: ponderosa pine-bunchgrass and ponderosa pine-Gambel oak. Higher densities of Gambel oak (Quercus gambelii) are often correlated with higher species richness, and the Gambel oak subtype provides critical nesting and foraging resources for many northern Arizona birds, including Mexican spotted owls." Additionally, desired conditions were added for ponderosa pine and frequent-fire mixed confer to clarify that at the fine scale, higher densities and canopy cover may be desired.*

Comment: Pages 66–68 of the DEIS should address important MSO habitat element categories including large trees, tree density, large logs, hardwoods, canopy cover, species composition, and residual plant cover. (DOI-16)

***Response:** The habitat elements, including snags and large logs (course woody debris section), specified on pages 66 to 68 are for a variety of species that were not necessarily captured in the course filter analysis). We added language to the FEIS to ensure it is clear that the plan provides for other key Mexican spotted owl habitat features.*

Comment: By removing the standards and guidelines in the proposed plan related to the Mexican spotted owl, the Forest Service is returning to an era of unlimited management discretion that would not avoid jeopardy or maintain the viability of sensitive animal population. (CBD-2)

***Response:** The plan and alternatives were developed to address viability for all species including threatened and endangered species. The threatened, endangered, and sensitive species guideline that incorporates by reference the habitat management objectives and species protection measures from approved recovery plans will keep the plan guidance current with all recovery plans. The Kaibab NF consults with the USFWS to avoid jeopardy and to provide for critical habitat for listed species at both the plan and project levels. No projects can be implemented in threatened and endangered species habitats without site-specific consultation with USFWS to address site-specific habitat needs and project mitigations needed to ensure viability. The USFWS has prepared a biological opinion for the plan FEIS. The EIS discusses the plan components that help maintain sensitive wildlife species. Appendix H crosswalks the different threats to wildlife species, including listed and sensitive species, with the plan components that reduce or eliminate the threats.*

Comment: The mid-scale desired condition that provides for 10 to 20 percent higher basal area in goshawk PFAs is not adequate to provide for the structural attributes required by the goshawk. (SC-19)

Response: *The desired conditions were developed to provide habitat for all associated native species by specifying desired conditions within the natural range of variability. Native species evolved with and are adapted to these conditions (see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013). Habitat structural attributes for goshawks were analyzed in the Species Viability Specialist Report and are discussed in the EIS under "effects common to all action alternatives," and "environmental consequences." See the wildlife section in appendix B for information on how vegetation structural states used in the vegetation analyses correspond to goshawk PFA needs (tables B-14 and B-19 through B-20).*

Comment: The DEIS analysis for risk to species viability for the proposed plan (alternative B) shows low risk for the goshawk because the analysis compares it to the achievement of the desired basal area, group sizes and openings, not the habitat needs outlined in the MRNG. (SC-78)

Response: *Part of the goshawk low viability risk rating for all habitat elements, other than frequent-fire mixed conifer, which had a moderate rating, is based on the different habitat elements meeting the desired conditions shown in the plan over a 50-year time period. The desired conditions for ponderosa pine and mixed conifer were developed to meet vegetation descriptions within the MRNG (see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis Updated: August 2013). The other factor that determines viability risk rating is the species forest ranking. Goshawks were given a forest rank of F3, as a conservative estimate of abundance, even though existing research on productivity (20+ years) on the North Kaibab Ranger District has demonstrated the species has saturated its habitat and is maintaining its population levels (Reynolds and Joy 2006). Additionally, preliminary results for recent goshawk surveys on the Williams and Tusayan Ranger Districts indicate high occupancy rates.*

Comment: The goshawk is not likely to thrive in forests that do not have high canopy closure and lifted crowns. (WILD-11)

Response: The desired conditions were developed to provide for the goshawk and its prey. The viability analysis in the EIS specifically assesses the viability risk and assures the continued viability of the northern goshawk and its habitat. The plan desired conditions for threatened, endangered, and sensitive species specify that "Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest." The fine-scale desired conditions for ponderosa pine state "Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group." These conditions lead to lifted crowns. The desired conditions also provide for a close interspersion of all forest structural stages (grass/forb/shrub, young forest, mid-aged forest, mature forest) that provide habitats for species critical to the food web of the goshawk (rabbits, ground squirrels, tree squirrels, etc.). Habitat requirements for the goshawk are not uniform throughout its home range; while areas of mature trees with high canopy closure are considered to be quality nesting/roosting habitat, it will not maintain a diversity of prey species. A high degree of interspersion of forest densities and structures is necessary to provide for all of the components of the goshawk's habitat and its prey species.

Rare and Narrow Endemic Species

Comment: Prior to giving up conservation of a rare species, the issues should be elevated to the regional level where a detailed inquiry of restoration options can be pursued. (LS-4)

Response: *The Kaibab NF has not "given up" conservation of any rare species. The revised plan provides for habitat and protection of rare species through multiple plan components and resource areas including threatened, endangered, and sensitive species and natural waters. In addition, rare species are directly addressed through their own section titled "Rare and Narrow Endemic Species" through desired conditions: "Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations, location and conditions of rare and narrow endemic species are known." and through the following guideline: "Project design should incorporate measures to protect and provide for rare and narrow endemic species where they are likely to occur. If there are additional management needs or gaps in the plan needed to provide for species viability, they may be addressed on a project-specific basis until the plan (programmatic) can be revised.*

Comment: The plan should provide guidance on how the forest intends to continue basic biological inventories particularly related to determining the occurrence, status, and habitat requirements of rare species. (LS-5, WILD-14)

Response: *The monitoring plan addresses the key monitoring needs that may be affected by forest management. Budgets and capacity limit what can be committed over the long term. In addition to the resource-specific surveys contained in the monitoring plan (song birds, aspen, Mexican spotted owl, Arizona Bugbane, and pediocactus), the Kaibab NF has funded and will likely continue to fund additional surveys through partnerships with other agencies, academic institutions, and non-governmental organizations.*

Comment: How are you going to protect plants with viability risk and other rare plant or populations that have not yet been found on your forest? (SN-1)

Response: *The viability requirement of the 1982 Planning Rule only requires the Kaibab NF to provide for species known to occur on the forest. An overarching goal of the forest plan is to restore the functionality of ecosystems that are departed and to maintain forest structure and function. This should provide the habitat required of rare plants that would have naturally evolved with those systems. If a new rare plant is discovered, species viability will be assessed at the project level until the plan (programmatic) can be amended or revised, if needed.*

Comment: The guideline for rare and endemic species to incorporate measures to provide for rare and endemic species "where they occur" does not meet the requirements to provide for all native species. (EBR-12)

Response: *We modified this guideline to read "Project design should incorporate measures to protect and provide for rare and narrow endemic species where they <u>are likely to</u> occur." This addresses the commenter's concern by ensuring consideration not just where there are known populations, but also where there is habitat within their known range.*

Nonnative Invasive Species

Comment: The EIS should provide a spatially based discussion of the extent and distribution of noxious weeds and weed spread. (CBD-17)

Response: *The Kaibab NF maintains spatial data about noxious weed locations in the corporate database (NRIS). Relevant information and discussion regarding the alternatives were included in the noxious weeds section of the EIS.*

Comment: Please add that nonnative aquatics directly and adversely affect other native species, through predation and habitat partitioning, and not just ecosystem function. (AGFD-31) In the first bullet, please add "or impact native wildlife" and "eliminated when practicable". (AGFD-32a) Add language that at the implementation level could facilitate native fish restoration (AGFD-32b).

Response: *In the non-native invasive introduction, the impacts of non-native aquatic species are now in their own paragraph and the following sentence was added. "They can out compete native animal species, alter food web interactions, and impact native vegetation." The first bullet in the desired condition now reads "Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems or impact native wildlife." The suggestion to add "eliminated when practicable" addresses management rather than an outcome and therefor does not meet the criteria for a desired condition. The suggestion to add a desired condition in the non-native section to facilitate native fish restoration was not included because there are no native fish found on the Kaibab NF.*

Comment: The plan should consider nonnative invasive animals using the same process it addresses nonnative plants. (KBPI-3)

Response: *This process for considering nonnatives was originally applied to plants, but was later expanded to include nonnative animals. Initially, there were a couple places where the language failed to reflect the expansion. This has been corrected.*

Comment: The DEIS should qualify its endorsement of connectivity, as it is often the isolation of some habitat types, such as springs, that protects them from invasion of nonnative species, such as crayfish, bullfrogs, and nonnative fish. (LS-11, WILD-20)

Response: *Connectivity connects adjacent habitat and promotes healthy movement of animals between foraging and wintering grounds, as well as genetic flow between populations. An animal's ability to move between optimal habitats is important in evaluating how well it responds to such disturbances overtime, however connectivity is not always desirable because it can facilitate the invasion of non-native species. This concern is now reflected in the nonnative invasive management approach section of the plan.*

Comment: The Forest Service should contribute to research toward the control of cheatgrass. (LS-16, WILD-17)

Response: *Addressing the need for "research" is outside the scope of the plan and plan process. However, the Kaibab NF does contribute to research for controlling cheatgrass. The Kaibab NF has been working on different science-based methods for controlling cheatgrass since 2007. In February 2012, a memorandum of agreement was developed among the Kaibab National Forest,*

the BLM, Grand Canyon Trust, AGFD, University of Arizona, USGS, and Northern Arizona University to establish a "Research Ranch." One of the primary focuses of the group is cheatgrass control. Research projects are being evaluated for how to reduce the spread of cheatgrass and additional measures of controlling cheatgrass.

Wildland Fire Management

Comment: The EIS should provide an analysis of suppressing unplanned ignition. (CBD-20)

Response: *While the plan provides some guidance for managing unplanned ignitions, fire suppression is an emergency response and is outside the scope of the forest plan decision.*

Comment: The standard that the Forest Service will suppress wildfires at the lowest cost and with the fewest negative consequences is not possible because you cannot maximize three variables that are at odds with each other. (EBR-7)

Response: *This standard was included in the revised plan to reflect the 2001 Federal Wildland Fire Management Policy that "Firefighter and public safety is the first priority in every fire management activity." And the 2009 Guidance for the Implementation of the Federal Wildland Fire Management Policy, which lists nine guidelines, including, "initial action on human-caused wildfire will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety." This plan standard does not imply that cost, firefighter safety, and public safety can all be "maximized" on every incident, but rather that a balance must be found between safety and cost, with priority given to firefighter and public safety.*

Comment: It seems that all the fire management strategies have been formulated from a standpoint of what to do after an ignition unwanted and/or "unplanned" human caused ignitions. There should be guidance to support preventing ignitions before they occur. (BB-1)

Response: *In response to this comment, the recreation desired condition was expanded to include fire prevention. It now reads "Visitors have access to information that enriches their recreation experiences and contributes to an understanding of their role in public land stewardship. "Leave No Trace," "Tread Lightly," fire prevention, wildlife awareness (e.g. lead reduction, Bear Aware, Animal Inn, etc.), and archaeological resource protection principles are promoted and practiced by the visiting public. Also included in the Wildland Fire Management Approach is the following statement ""Fire prevention is an integral part of the fire management program. The goal of the fire prevention program is to educate the public to reduce the number of potentially harmful human caused fires; the prevention program also works with project managers to develop practices and protocols that are less likely to result in ignitions from management activities and recreational use."*

Air Quality

Comment: The unintended and unacceptable consequences of alternative D would result in never ending costs of prescribed burning and smoke in the Grand Canyon during tourist season. It is not implementable because the public would stop the process. (JK-4)

Response: *The air quality section of the EIS, explains that all alternatives are expected to achieve the desired conditions for air quality: "Air quality meets or surpasses State and Federal ambient*

air quality standards" and "Management activities on the Kaibab NF do not adversely impact Class I airshed visibility as established in the Clean Air Act."

This is because the number of acres burned with prescribed fire is expected to be the same under all alternatives due to legal, climatological, social, and logistical limits on the number of acres that can be burned per year. The reasons for this are more fully explored in the assumptions section of the Air Quality Specialist Report (USDA Forest Service KNF 2012a).

Comment: The Plan indicates that smoke is the only air quality issue that provokes public outcry (Draft Plan p. 48- 49). Public meetings related to the 20-year mineral withdrawal of public lands surrounding Grand Canyon drew large turnouts, many with concerns about air quality, dust, and particulate contamination, indicating a lack of public tolerance for the risks from contaminated dust at uranium mine sites. (SC-56)

Response: *Because the statement about smoke being the only air quality issue that provokes public outcry it is not entirely accurate, we have removed it from the revised plan. Contaminated dust was raised as an issue at public meetings for the uranium withdrawal, although it was not brought up at forest plan public meetings. The FEIS now discusses the potential for radioactive elements to be released from prescribed burns.*

Comment: The coal-burning power plants in northern Arizona result in the air quality in and around Grand Canyon National Park often being poor. The Kaibab NF needs to take care so that actions within the Forest don't exacerbate the air quality problem. (SC-55)

Response: *For the past ten years, 70% or more days were rated in the Good category by the EPA Air Quality Index. Good is the best rating, where air pollution poses little risk to human health. Less than 1% of days per year rated in the Unhealthy for Sensitive Groups category, and no days were rated Unhealthy, Very Unhealthy or Hazardous (US EPA 2010).*

The plan contains the following desired conditions to ensure projects and activities do not contribute to poor air quality: "air quality meets all State and Federal ambient air quality standards," and "management activities on the Kaibab National Forest do not adversely impact Class I airshed visibility as established in the Clean Air Act.

Additionally, the plan contains two guidelines to address this concern: "Project design for prescribed burns and strategies for managing wildfires should incorporate as many emission reduction techniques as feasible, subject to economic, technical, and safety criteria, and land management objectives." and "Decision documents, which define the objectives and document line officer approval of the strategies chosen for wildfires, should identify smoke sensitive receptors, and identify appropriate objectives and courses of action to minimize and mitigate impacts to those receptors.

Comment: The impacts of fugitive dust should be more thoroughly considered in the Transportation section of the DEIS. (LS-23)

Response: *Effects from fugitive dust are discussed in the air quality section of the EIS, not in the transportation section. The air quality section of the EIS indicates that the Kaibab NF and surrounding lands are all classified as being in attainment (meaning "in compliance") for all criteria pollutants of the National Ambient Air Quality Standards. This includes compliance for*

the small-diameter particulate matter (PM_{10} and $PM_{2.5}$) that is largely responsible for visibility impacts to Class I airsheds. Particulate levels as measured by the Interagency Monitoring of Protected Visual Environments (IMPROVE) network are generally low, but episodic events do occur (BLM 2011). Heavy equipment used during project implementation has the potential to create localized impacts from fugitive dust. With high wind events, this fugitive dust has the potential to be carried for several kilometers. Mitigation measures developed for site-specific projects can reduce these localized particulate matter emissions, such as reducing travel speeds on unpaved surfaces and ceasing work activities during periods of high winds.

Comment: Burning the forest will release radionuclides stored in its soils and vegetation and expose citizens to increased radiological doses. (DH-1)

Response: *The DEIS did not address the potential effects of prescribed burning to release radionuclides. In response to this comment, further research was done, and the findings are included in the Air Quality Specialist Report (KNF 2012a) and in the air quality section of the FEIS. Findings indicate that while radionuclides are released during prescribed fire activities, the levels are very low and below thresholds that produce a risk to human health.*

Cultural Resources

Comment: The Forest Service should cite the United Nations Declaration on the Rights of Indigenous Peoples in the Decision and incorporate its policies and procedures. (HOPI-5)

Response: *The declaration had not been published when the draft plan was released. It doesn't actually contain policy and procedures, but it does lay out goal statements that are well reflected by the plan components in the cultural resources, traditional cultural properties, and traditional uses sections. In response to this comment, the declaration is now listed in the plan appendix B relevant laws, regulation, and policy, "other" section.*

Comment: There should be discussion of the management of sacred sites and ethnographic resources that are not necessarily archaeological, a traditional cultural property (TCP), or a traditional use area. (KBPI-4)

Response: *We added discussion to the management approach for traditional cultural use to reflect this comment. The section now states: "The Kaibab NF recognizes that there are important tribal sacred sites, ethnographic resources and traditional use areas that may not meet the definition of a historic property. The Kaibab NF will work to protect these resources using existing authorities in collaboration with federally recognized tribes."*

Comment: We think that heritage resources and TCPs should have been identified as a priority needs for change. (HOPI-1)

Response: *The four priority needs for change were identified in the AMS by considering key issues related to ecological and socio-economic sustainability where the conditions and trends indicated the greatest need for a change. Although they did not emerge as a priority need for change, heritage resources and TCPs were given full attention during plan development. Through collaborative meetings with area tribes, we developed sections of the plan to address cultural resources, TCPs, traditional and cultural uses, and the Red Butte Management Area. Additionally, we incorporated tribal comments into plan components for a wide variety of resources and uses throughout the plan including springs, caves, pinyon-juniper communities,*

recreation, forest products, and mineral and mining activities. See Heritage Specialist Report for details.

Comment: TCPs should also be protected from mining activity, not just sites listed on the National Register of Historic Places and State highways. (SC-64)

Response: *The revised plan contains desired conditions and guidelines to preserve and protect TCPs from impacts related to various uses; however the Forest Service does not have the discretionary authority to prevent mining of locatable minerals on public domain lands as prescribed by the 1872 Mining Law (as amended).*

Comment: Mineral withdrawal authorities should be used to proactively protect sacred sites. (HOPI-4)

Response: *The Bureau of Land Management is the agency responsible for mineral withdrawals. Therefore, mineral withdrawals are outside the scope of the plan revision decision.*

Comment: The guideline "The purposeful excavation of human remains for educational purposes, such as research or field schools, should not be permitted" should be a standard. (EBR-10)

Response: *We concur. The Kaibab NF has had a policy of prohibiting the purposeful excavation of human remains for educational purposes such as research or field schools since 1989, as articulated in its memorandum of understanding with the Havasupai Tribe, Hopi Tribe, Hualapai Tribe, and Kaibab Band of Paiute Indians. This policy was originally framed as a guideline in the draft plan, but has been reworded to reflect that it is a standard.*

Comment: The objective of 100 acres of non-project survey is so low; it would take many, many years to complete the heritage survey needed to protect cultural resources. The objective for non-project related cultural resource survey acreage should be increased to better identify and protect sites. (KBPI-1, HOPI-2)

Response: We increased the acreage in this objective in the final plan from 100 to 200 acres per year in response to these comments and national guidance. In addition to non-project-related survey, the Kaibab NF completes an average of 5,000 and 10,000 acres of project-related survey each year. Non-project surveys typically entail higher costs per acre due to higher densities of archaeological sites in areas of high archaeological interest. The Kaibab NF will continue to conduct the maximum amount of non-project survey each year contingent on resources and funding.

Comment: Depending on the size and impact of the surface use and occupancy, the "foreground" may not be enough. Is this strictly to hide the activity from the public or is it about protecting the site/resource? (SC-63)

Response: *This comment refers to the standard for mineral and mining activities that "surface use and occupancy is restricted to the foreground of heritage sites nominated or listed on the National Register of Historic Places." This standard was originally developed to reduce the visual impacts in the immediate foreground of specific areas identified in the 1988 Forest Plan as amended. This standard provides plan direction for specific visually sensitive areas. The forestwide and management area direction in the plan address resource protection such as those*

related to soils and watershed, recreation, and scenery which provides direction for managing scenery and varying distances within the greater viewshed.

Comment: The plan should replace the words "Kaibab-Paiute" with "Kaibab Band of Paiute Indians" to be more accurate and specific. (KBPI-2)

Response: *We corrected the wording and the plan and EIS now reflect the more accurate name as "Kaibab Band of Paiute Indians."*

Recreation and Scenery

Comment: The EIS should explore and disclose ongoing and expected impacts of climate change on winter recreation use and cold-water fishing. (CBD-23)

Response: *Climate change is addressed as an integrated part of the EIS, rather than as a stand-alone set of desired conditions and effects. The EIS and plan emphasize managing for resistance and resilience in forest and grassland ecosystems, which will help protect the recreational opportunities available in these ecosystems. The potential effects of climate change on outdoor recreation were included in the development of the Forest's Climate Change Approach (appendix D).*

Comment: Efforts should be made to protect viewsheds beyond "the immediate foreground (0 to 300 feet) in the Desired Conditions for National Scenic and Recreation Trails. The distance considered within the view shed should depend on topography, not a straight line distance. (SC-68)

Response: *The forestwide direction for scenery (as mapped using the Scenery Management System) provides complimentary direction for viewsheds beyond the immediate foreground of the National Scenic and Recreation Trails*

Comment: While we are glad to see that snowmaking will not be allowed at the Elk Ridge Ski Area on Bill Williams Mountain, this may not be the only place where snowmaking would be requested. (SC-57)

Response: *Snowmaking at the Elk Ridge Ski Area was previously evaluated and determined to be inconsistent with multiple desired conditions associated with Bill Williams Mountain. As a result, guidance was developed specifically for the Bill Williams Management Area. The issue of snowmaking in general was not determined to be inconsistent with the plan and would need to be addressed on a site-by-site analysis basis due to varying conditions and issues that could arise with each proposal.*

Comment: The plan should specifically address the Great Western Trail Route and include language acknowledging and preserving this recreation opportunity as well as recognition for the need to maintain signage identifying its presence and alignment. (AQ-1)

Response: *We agree. In response the following desired condition was added to the plan: "The Great Western Trail route can be driven boundary to boundary through each of the districts where it occurs. Signage helps to identify and highlight the route."*

Comment: The plan should include provisions for a designated system of backcountry airstrips that provide opportunities for recreation aviation including access to internal trailheads. (RAF-1)

Response: *The plan would not preclude the establishment of backcountry airstrips; however, any proposal would need to go through site-specific analysis.*

Comment: Backcountry airstrips could be established on existing closed roads or abandoned airstrips, or grassland parks. (RAF-2)

Response: *The plan does not preclude the establishment of backcountry airstrips. However, the establishment of such areas would require site-specific analysis and decision.*

Comment: The plan should allow aircraft in semiprimitive nonmotorized areas due to their ability to provide low impact access. (RAF-5)

Response: *Motorized uses are prohibited in areas designated as semiprimitive nonmotorized, regardless of impacts.*

Comment: The Management Approach that addresses air traffic in the vicinity of Red Butte should include language that "Educational brochures distributed by the Arizona pilots association will broadcast awareness of this sensitive area, and when tribal events are taking place, APA assistance in generating a NOTAM (Notice to Airmen) will route aircraft away from the area." (RAF-6)

Response: *The suggested language was not included verbatim because it is too specific in nature, but language was added to the management approach section for Red Butte to capture the intent of the comment. The management approach for Red Butte now includes the statement: The Forest Service does not have the authority to regulate air traffic (flights), so it is important that the Kaibab NF work closely with and educate potential operators about the impacts. When temporary closures are in place for traditional or ceremonial use, a request for air operators to avoid the area may be made."*

Comment: Recreation aviation should not be considered a special use, but just another legitimate method of access. (RAF-9)

Response: *While the activity of recreational flying is not a special use, landing requires infrastructure and/or accommodation to ensure public safety and resource protection. Such infrastructure requires a special use authorization under the policy provided in Forest Service Handbook 2709.11*.

Comment: The plan should include a bullet that "Backcountry airstrips are constructed of natural material and allowed to return to natural vegetation, and they should be minimally marked consistent with safety requirements." (RAF-4)

Response: *The recreation section in the plan already contains guidelines for constructed features in the backcountry that already addresses these concerns. The construction and/or maintenance of airstrips on the Kaibab NF would require a special use authorization. Should the Kaibab NF receive and accept a proposal, a site-specific environmental analysis would be required. If*

approved for authorization, any stipulations or requirements resulting from the analysis would be included in the subsequent permit and operating plan.

Comment: The glossary should contain a definition of back country airstrips. (RAF-8)

Response: *The term "back country airstrips" does not appear in the plan, and as such is inappropriate to appear the glossary.*

Comment: If there are no appropriate locations for backcountry airstrips, please describe what criteria were used and what sites were considered in making this determination? (RAF-11)

Response: *The Kaibab NF planning process did not conduct site-specific evaluations for backcountry airstrips. The plan would not preclude the establishment of backcountry airstrips, but we have no areas that are known to be appropriate for accommodating recreational fly-in activities. The determination of the appropriateness of particular locations for backcountry airstrips are site-specific in nature and would only be made following an analysis of trade-offs and resource impacts.*

Comment: With proper procedures to alleviate potential conflicts with motorized vehicles on the ground, open roads may serve a dual role as a backcountry airstrip. (RAF-10)

Response: *The plan does not preclude the approval of an open road for use as a backcountry airstrip. This is outside the scope of the plan revision process.*

Comment: The word "airstrips" should be added to the desired condition statement "Forest roads, bridges, and trails provide safe, legal and reasonable access for recreation opportunities." (RAF-3)

Response: *Currently there are no airstrips on the Kaibab NF that can provide safe and legal access, and it has yet to be determined if there are any locations that might be appropriate in the future. This determination can only be made through site-specific analysis. Should an airstrip become established in the future, an adjustment could be made to this desired condition statement.*

Transportation and Forest Access

Comment: The EIS should provide an analysis of the transportation network and its impact on physical chemical, and biological forest properties and processes. (CBD-18)

Response: *The transportation network recently underwent a site-specific analysis on each of the districts as part of the travel management planning process. The plan and EIS are programmatic in nature and do not repeat or revisit previous site-specific analysis and decisions. Additionally, the EIS analysis is focused on differences among alternatives and potential changes from baseline. There was no difference among alternatives with regard to transportation.*

Comment: Forest projects and activities that have the potential to impact the ADOT Right of Way on SR 67, SR 64, I-40, HWY 180, and/or HWY 89A should: (1) mitigate sediment, vegetation or debris causing track-out (mud) from vehicles; (2) limit the amount of disturbance to existing ground cover vegetation to limit erosion in drainages hydraulically connected to the storm water conveyances; and (3) implement storm water conveyance BMPs (straw wattles, hydroseeding, check dams, etc.) to control sediment in storm water runoff. (ADOT-1)

Response: *Activities on these specific roads are outside the scope of the plan revision decision. These concerns are addressed through the use of best management practices (BMPs) and other activity design elements, which are incorporated into project-level planning and implementation in accordance with the memorandum of understanding among the Arizona Department of Transportation, the Federal Highway Administration, Arizona Division, and the USDA, Forest Service, Southwestern Region Regarding the Construction, Operation, and Maintenance of Highways in Arizona Crossing National Forest System Lands.*

Comment: Road closure through wetlands and meadows also should be more thoroughly evaluated. (LS-24)

Response: *While the plan provides guidance for locating new and temporary roads, site-specific road closures are outside the scope of the plan revision decision. All roads on the Kaibab NF have gone through recent site-specific planning under the Travel Management Rule.*

Livestock Grazing

Comment: The 1982 planning regulations state that suitable and capable lands "shall be identified" and that their trend "shall be determined." This document fails to do this. (EBR-31)

Response: *Capability to produce forage for grazing animals was determined for the original forest plan (USDA Forest Service KNF 1988). Most landscape-scale conditions that influence capability have not changed significantly since the initial evaluation. However, the data and analysis tools used in the initial determination were not as accurate or precise as what is available today. For this revised plan, capability was revisited using the corporate GIS data. Table 2 of the revised plan displays the results of the recent capability analysis. The area capable for livestock grazing has about 12 percent fewer acres than the original forest plan. More detail about the process and the rationale behind these calculations are documented in the white paper "Grazing Capability Calculations for the Kaibab NF" filed in the project record.*

The current forest plan analysis met the regulations for identifying suitable and capable lands and trend. Subsequent NEPA analysis for each of the allotments was used to determine trend information. The decisions for those analyses were reviewed for areas where livestock grazing was not authorized. Site-specific NEPA identified three large contiguous areas that were not authorized for grazing following environmental review: the Kanab Creek allotment, Jump-up Pasture of the Central Winter allotment, and the Bill Williams Mountain portion of the Hat allotment. In the revised plan and other action alternatives, these areas are identified as not suitable for livestock grazing. A summary of this analysis is included in the EIS appendix D, Grazing Suitability and Capability.

A suitable determination indicates that grazing is compatible with the desired conditions for the relevant portion of the plan area. It is guidance for project and activity decision making, and is not a commitment or a final decision. It does not mean that grazing will or will not occur in a particular area. The final decision to authorize livestock grazing and the determination for how lands are managed (including those that have been identified as not capable of producing forage), is made at the project or allotment level. The decision to authorize grazing and under what conditions is made following environmental review (NEPA) where site-specific conditions can be assessed and addressed through project design.

Comment: The 1982 planning regulations state that those lands "in less than satisfactory condition shall be identified and appropriate action planned for their restoration." This document does not meet those requirements. (EBR-32)

Response: *Less than satisfactory soil conditions have been identified in the Terrestrial Ecosystem Survey data. A majority of the unsatisfactory soils on the Kaibab NF occur on steep slopes or in dense pinyon-juniper vegetation that is not typically grazed. The plan lays out desired conditions, objectives and guidelines for protecting and restoring soils and watersheds. Restoration of these lands would be accomplished through plan objectives such as thinning, fire, and noxious weed treatments and implemented through site specific analysis and project-level planning. Priority areas were identified in the Watershed Condition Framework. The Kaibab NF uses an adaptive management strategy to manage the rangeland resources. Allotment management plans and associated grazing authorization decisions are made about every ten years following an environmental analysis in conformance with the National Environmental Policy Act (NEPA). As part of the NEPA analysis, condition and trend, including soils are assessed and resource conditions of concern are assessed and disclosed. The grazing management guidelines in the revised plan state that "annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). As a result, if grazing was contributing to the unsatisfactory soils, the grazing management would be adjusted through the annual operating instructions.*

Comment: The negative effects of livestock grazing are only superficially addressed in the DEIS. The removal of forage as well as disruption of nesting cover can have effects on large and small mammals. (WILD-25)

Response: *Ongoing grazing effects to wildlife were not specifically called out in the DEIS analysis because grazing did not emerge as an issue or high risk factor. Livestock grazing is managed through adaptive management and adjustments are made continuously, as resource concerns are identified. To provide protection for wildlife, a guideline states "Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, soils, weeds, fawning habitat, and other wildlife needs)." This guideline is in addition to livestock grazing manual and handbook policy and direction. See appendix H of the EIS for for those species which could likely be affected by grazing, (e.g. grassland, meadow, and shrub-dependent species, and species needing interconnected habitat), and the plan components that mitigate that risk.*

Comment: The plan should develop alternative ways of grazing to meet the 1982 rule requirements. (EBR-34)

Response: *We developed alternatives only in response to issues raised. No specific issues were raised related to grazing that were not already addressed by the proposed action. We did add language to clarify the role of monitoring, adaptive management, and the annual operating instructions in the revised plan and action alternatives.*

Comment: The Forest Service should have developed alternatives to address grazing issues such as cool season grasses, aspen, riparian systems, water developments, capability/ suitability, and the amount of unsatisfactory soils as well as how monitoring has been implemented and what it has shown.(EBR-37)

Response: *The revised plan contains components to address cool season grasses (livestock grazing), aspen, wetland/cienegas, natural and constructed waters, soils and watershed, and capability/suitability. Under the action alternatives, there is a desired condition that livestock use is consistent with other desired conditions and that annual operating instructions should "address any relevant resource concerns." Under all alternatives, grazing can be reduced or adjusted in response to any site-specific resources conditions within any grazing allotment. No grazing-related resource issues were raised that could not be addressed with the adaptive management strategy included in the revised plan and alternatives. (See livestock grazing section of the revised plan and DEIS/FEIS).*

Most range-related monitoring is site-specific and conducted at the project level; however, the forestwide monitoring plan does help to ensure effectiveness of grazing management, see monitoring questions for soils and watersheds, aspen, natural waters, and livestock grazing.

Comment: Guidelines for restoring grasslands should include removing grazing in areas where native herbaceous cover and seeds sources are sparse. (SC-37)

Response: *There is no need for a guideline specific to restricting grazing in grassland restoration areas where native herbaceous cover and seeds sources are sparse, because the livestock grazing guidelines in the plan specify that the annual operating instructions should address any relevant resource concerns. As such, they would address areas where there is a restoration need for understory vegetation establishment. The AMS/CER need for change specified that the primary need for grassland restoration is to remove encroaching trees and modify fences for pronghorn passage. Removal of trees in encroached grasslands will increase understory.*

Comment: The EIS should provide an analysis of livestock grazing along with the direct, indirect, and cumulative impacts. (CBD-19)

Response: *The EIS does analyze livestock grazing. Direct, indirect, and cumulative effects on the grazing resources can be found in chapter 3 of the FEIS in the Livestock grazing section. Effects on other resources from grazing are assessed in their respective sections (e.g. soils, wildlife, etc.).*

Comment: As an identified issue, reduced livestock grazing should have been given a more thorough evaluation. (EBR-24)

Response: *The Kaibab NF considered a reduced grazing alternative, but did not analyze in detail (see chapter 2 of the EIS) because under all of the alternatives the livestock grazing program has multiple mechanisms to evaluate, review, and adapt management as needed to effectively protect resources and respond to changing conditions. No plan-level changes to the grazing program were identified during scoping, only general statements about grazing impacts to watersheds, streams, and grasslands. Any site-specific concerns may be addressed on a site-specific basis.*

Comment: Aspen stands and wetland areas should be protected from livestock grazing. (SC-58)

Response: *The Livestock Grazing section of the plan provides guidelines for wetlands and aspen. We have evaluated wetland and aspen effects from livestock grazing in our livestock grazing NEPA analysis since 1992. Where livestock are having long-term effects on these areas, livestock exclosures, pasture deferrals, and special utilization limits are being used to reduce these impacts. Future evaluations of these areas will further determine livestock impacts and additional adjustments will be made, if necessary. The revised plan objectives would restore at least 6 acres*

of wetlands within 5 years of plan approval. The new forestwide monitoring plan includes questions that will also help identify any potentially negative impacts from livestock in aspen and wetland areas.

Comment: Natural waters should be protected from livestock and nonnative ungulate grazing. (SC-52)

***Response**: The plan components do contain direction for protecting natural waters from livestock and non-native ungulate grazing. They include desired conditions for healthy sustainable conditions, objectives to "protect and/or restore at least 10 individual springs within 5 years of plan approval," "restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval, and " guidelines that "mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects (to natural waters)", and "annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.)."*

Comment: The plan needs to calculate suitability and capability for livestock grazing in a scientifically justifiable manner. (EBR-33)

***Response:** The current forest plan analysis meets the regulations for identifying suitable and capable lands and trend. Subsequent NEPA analysis for each of the allotments was used to determine trend information. The decisions for those analyses were reviewed for areas where livestock grazing was not authorized. Site-specific NEPA identified three large contiguous areas that were not authorized for grazing following environmental review: the Kanab Creek allotment, Jump-up Pasture of the Central Winter allotment, and the Bill Williams Mountain portion of the Hat allotment. In the revised plan and other action alternatives, these areas are identified as not suitable for livestock grazing. A summary of this analysis is included in the EIS appendix D, Grazing Suitability and Capability.*

Capability to produce forage for grazing animals was determined for the original forest plan (USDA Forest Service KNF 1988). Most landscape-scale conditions that influence capability have not changed significantly since the initial evaluation. However, the data and analysis tools used in the initial determination were not as accurate or precise as what is available today. For this revised plan, capability was revisited using the corporate GIS data. Table 2 of the revised plan displays the results of the recent capability analysis. The area capable for livestock grazing has about 12 percent fewer acres than the original forest plan. More detail about the process and the rationale behind these calculations are documented in the white paper "Grazing Capability Calculations for the Kaibab NF" filed in the project record.

Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Areas within the plan area are not suitable if livestock grazing would be incompatible with the desired conditions or result in substantial and permanent impairment of the land. Determinations of suitability consider available science, but are necessarily qualitative analysis. Capability is a course filter analysis based on physical characteristics such as soils, slope, and landform. Capability is the potential for an area to produce at least 100 pounds of forage per acre, per year. It does not indicate the amount of forage produced, but rather the potential for forage to be produced. Actual production is dependent on precipitation.

A suitable determination indicates that grazing is compatible with the desired conditions for the relevant portion of the plan area. It is guidance for project and activity decision making, and is not a commitment or a final decision. It does not mean that grazing will or will not occur in a particular area. The final decision to authorize livestock grazing and the determination for how lands are managed (including those that have been identified as not capable of producing forage), is made at the project or allotment level. The decision to authorize grazing and under what conditions is made following environmental review (NEPA) where site-specific conditions can be assessed and addressed through project design.

Comment: The DEIS needs to reveal where water is piped off-site to grazing structures, what their condition is, and include standards so this no longer happens. (EBR-35)

***Response**: The DEIS summarizes the existing conditions of natural waters, but does not provide detailed site-specific information. Detailed information on the condition, including modifications, of most of the waters (springs) on the Kaibab NF can be found in the project record in a report: Ecohydrology of Springs on the Kaibab National Forest to Support Planning (Stevens and Ledbetter 2012)*

While there are no standards for preventing water from being piped off of natural waters, there are objectives in the plan for restoring springs and wetlands, desired conditions for healthy functioning natural waters and guidelines that state "spring source areas should be preferentially protected," "water rights for springs should be secured where there are no existing water rights or claims," and the impacts of management activities on springs, streams, and wetlands should be evaluated and minimized." These desired conditions and guidelines for natural waters would not support new modifications that pipe water away from sources, as they would not be consistent with the plan direction.

Comment: Cattle grazing guidelines should be developed to prevent the degradation of reservoir banks impacts and important sport fisheries, like those that can be seen at White Horse Lake. (AGFD-37)

***Response:** All sport fishing lakes on the Kaibab NF, including White Horse Lake, are already excluded from livestock grazing. Therefore, grazing guidelines for these areas are not needed. We are unaware of any impacts to the banks of lakes with sport fisheries except those associated with trampling from recreationists.*

Comment: The plan should authorize the voluntary permanent retirement of grazing allotments by permittees for conservation purposes. (RE-21, WILD-26a, SC-110)

***Response:** The authority to permanently retire an allotment from grazing is retained by the Forest Service and is not held by the permittee. When the Forest Service retires an area from grazing, it is typically based on site-specific resource concerns. All of the allotments within the Kaibab NF receive annual inspections. Since 1992, all allotments have been analyzed for livestock grazing effects through project-level grazing authorization, and as a result, some areas have been permanently retired from grazing. This comment is outside the scope of forest plan revision.*

Comment: Please add a DC in the grazing section that indicates that grazing duration and intensity occurs "at levels that do not conflict with, damage, or otherwise harm valued resources including wildlife. (AGFD-33)

Response: *This desired condition would be redundant with other direction already included in the revised plan. Prevention of harm/damage applies to all activities and resources, not just grazing and wildlife.*

Comment: We recommend that *"concentrated use of montane meadows"* be avoided. If options elsewhere were limited, we could support light use if adequate rotation occurred, and grazing. (AGFD-34)

Response: *The full grazing guideline on use of montane meadows is as follows: "The concentrated use of montane meadows for livestock grazing should be minimized when soils are saturated to reduce grassland impacts. When no other options are available, use should be rotated annually." It is not promoting a concentrated use of the meadows; rather it is stating that it should be at a level that prevents grassland impacts.*

Comment: The Department supports utilization decisions that are made on an allotment-by-allotment ecological basis, rather than a forest wide decision of 30/40 percent (AGFD-36)

Response: *The conservative use levels referenced in the Livestock Grazing Management Approach says "in general, the Kaibab NF continues to keep grazing at conservative use levels (30 to 40 percent). This grazing intensity, based on percent use of forage by weight, should provide for plant integrity, density, diversity, and regeneration over time." This statement does not preclude a different use level following site-specific analysis.*

Comment: There is nothing in the plan to support the assertion that conservative use levels (30 to 40 percent) will provide for plant integrity, density, diversity, and regeneration over time. (RE-22)

Response: *The conservative livestock use level of 30 to 40 percent, which includes native wildlife ungulate use, has been evaluated in all the range allotments on the Kaibab NF since 1992. This use level leaves 60 to 70 percent of the plants for ground cover, soils, fire spread, hiding cover, and forage for other animals and insects. Grazing research supports this level of grazing. Conservative utilization leaves residual cover for wildlife and soils, and provides for long-term health of the grazed plants (Smith et al. 2005).*

Comment: There should be opportunities for participation and more transparency in the Annual Operating Instruction decisions process. This would be particularly helpful for decisions such as range readiness after a disturbance event. (AGFD-35)

Response: *There are opportunities for transparency and participation in the annual operating instruction process and decisions; however, it is outside the scope of the plan decision.*

Comment: The AGFD Statewide Pronghorn Plan (April 2006) recommends a smooth bottom wire greater than or equal to 20 inches above the ground, but the plan says 18 inches. (RE-12)

Response: *While the Kaibab NF works closely with the AGFD to meet the needs of pronghorn antelope, the AGFD does not set forest policy. The livestock grazing guideline in the plan says that "new construction and reconstruction of fences should have a barbless bottom wire that is at least 18 inches high. Where needed, the bottom wire may be higher and goat bars are sometimes installed to facilitate pronghorn passage, particularly in areas that pronghorn are known to use. Fences are designed to keep livestock within a pasture or allotment. When the bottom wire is at*

least 18 inches, there are many places where the fence is 20 inches above the ground due to uneven ground conditions.

Comment: The forest plan should use the word "must" with regard to pronghorn friendly fences so that the needed modifications actually happen. (RE-13)

Response: *In the DEIS and FEIS under "Assumptions" on the first page of chapter 3, it states that the "plan provides a programmatic framework that guides site-specific actions, but does not authorize, fund or carry out any project activities." As a result, it does not does not require actions. The ability to carry out objectives is contingent upon the Kaibab NF's capacity. Pronghorn fence modifications are done in priority areas as resources and budget allow. Many fences in areas of known pronghorn usage (high priority areas) have already been modified*

Comment: The Forest Service should allow grazing allotment holders to substitute pronghorn for cattle in order to address the current population decline. (LS-18, WILD-26b)

Response: *The plan addresses livestock grazing. Livestock grazing allotments on the Kaibab NF are not grazed at levels that limit pronghorn populations. Grazing utilization is set for all allotments at the conservative level of 30 to 40 percent, leaving at least 60 percent of the forage. The NEPA analysis process for each allotment since 1992 has analyzed the effects of livestock grazing on pronghorn. Each year, livestock numbers are set in each allotment so livestock numbers are matched with annual forage production.*

Comment: The plan and DEIS should provide details explaining how the Kaibab NF will provide for quality antelope habitat (hiding cover and high quality food resources) and also provide forage for nonnative cows and elk. (RE-10)

Response: *The plan contains desired conditions for all grasslands including "in pronghorn habitat, understory vegetation provides cover for fawning…" and "understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species…." In addition, a desired condition under all pinyon-juniper communities states "…the configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators." The plan contains a guideline for the annual operating instructions for grazing permittees to balance use with capacity and address any relevant resource concerns, including wildlife habitat. Use levels are set individually for each allotment, but are typically 30 to 40 percent to provide for a suite of desired conditions including wildlife habitat, forage, and watershed health.*

Comment: Forage reserves need greater flexibility than the two stated purposes. Wording in the guideline should be written with more flexibility to address other potential needs including those associated with wolf expansion. (CM-1)

Response: *We adjusted the language in the guideline so that it replaces the words "range management in times of drought" with "in response to other range management needs." The guideline now reads "As grazing permits are waived back to the Kaibab National Forest, they should be evaluated for conversion to forage reserves to improve flexibility for restoring fire-adapted ecosystems and in response to other range management needs."*

Comment: The forest should provide the scientific justification for use by nonnative herbivores on any Map Unit where the erosion rates are 100 percent and greater of natural. (RE-14a) The forest should provide the scientific justification for the use or grazing by nonnative herbivores on any map unit where the current litter is less than or equal to 50 percent and the erosion rates are equal to or greater than 100 percent of natural. (RE-14b)

Response: *The forest plan is not the place to provide scientific justification for livestock use. Livestock evaluations are made during allotment analysis in the NEPA process. In addition, the TES documents on-the-ground conditions as observed during the field mapping phase of the project (i.e., 1979 to 1986). The TES is therefore a somewhat dated and static document with regard to the definition of "current conditions." Soils and watershed conditions are assessed and data are collected as part of NEPA analyses for grazing allotment renewals. These data are used to support determinations of grazing capacity, utilization, and stocking levels.*

Comment: The plan should have a requirement that there is a quantitative and qualitative analysis prior to issuing the annual operating instructions showing that there is adequate open water for grazing animals and wildlife. (RE-16)

Response: *Guidelines in the Livestock Grazing section of the plan state that the annual operating instructions should address "any relevant resource concerns." While adequate water is one of the resources considered, the plan is programmatic in nature and does not specify every aspect of day-to-day management. The annual operating instructions are prepared based on the current conditions and short-term outlook for forage and water. Adjustments are made throughout the season based on actual conditions.*

Comment: The DEIS states that a majority of grazing lands "show an improvement." What is the basis for this statement? (EBR-29)

Response: *All allotments within the Kaibab NF were recently analyzed for livestock grazing effects since 1992, along with annual inspections. This summary was prepared from these allotment-specific analyses and added to the FEIS appendix D, Grazing Suitability and Capability.*

Comment: The plan should include a drought policy that is proactive and science-based rather than subjective based on professional opinion. (RE-17)

Response*: The revised plan does not include a drought policy; however, it does address climate change in a proactive and integrated way (See appendix D of the revised plan). The Kaibab NF "drought policy" is a three-forest policy with the Coconino and Prescott National Forests and is outside the scope of the plan decision.*

Comment: The plan should include a set of defensible standards to prevent an overbearing industry representative or permittee from insisting that grazing is good for the landscape. (EBR-41a)

Response: *The Livestock Grazing section of the EIS provides guidelines for livestock grazing. Permittees must follow the terms of their permits. Livestock grazing and special use permits are prepared to be consistent with the desired conditions in the plan, which was developed collaboratively. The Kaibab NF follows the NEPA process in project-level planning for grazing*

authorization, and all individuals have equal standing and opportunity to comment on projects and raise issues about the potential effects.

Timber Suitability

Comment: The Forest Service must ensure that timber will only be harvested from National Forest System lands where "(i) soil, slope, or other watershed conditions will not be irreversibly damaged...." (CBD-5) Timber suitability determinations "shall...be embodied in appropriate written material, including maps, and other descriptive documents reflecting proposed and possible actions, including the planned timber sale program and the proportion of probable methods of timber harvest within the unit necessary to fulfill the plan" (1604(f)(2)). (CBD-4)

Response: *The timber suitability analysis for the plan and alternatives was conducted following the guidance in the 1982 Planning Rule provisions. The timber suitability process determinations and maps are documented in chapter 4 of the revised plan and appendix C of the EIS. Of the forested National Forest System lands administered by the Kaibab, the lands identified with a potential for irreversible resource damage were identified as unsuitable for all action alternatives. The list of proposed and possible actions including mechanical thinning objectives and probable management prescriptions are listed in appendix A of the revised plan.*

Comment: The Forest Service should consider and analyze lands with high erosion hazard, steep slopes, within one tree height of perennial or intermittent streams, unroaded areas, critical habitat, areas occupied by threatened, endangered, sensitive, or endemic species, and MIS sensitive species conservation areas in the determination of suitable and unsuitable lands for sustained yield timber production: (1) High or severe soil erosion hazard identified by Terrestrial Ecosystem Survey; (2) slopes steeper than 30 percent; (3) lands within one site-potential tree height of perennial or intermittent streams or wetlands; (4) contiguous areas larger than 1,000 acres without roads in all vegetation types; (5) occupied and/or critical habitat of threatened or endangered species or species proposed for listing; (6) designated conservation areas for sensitive or management indicator species; (7) occupied locations of endemic species; and (8) lands directly impacted by high-severity fire effects to vegetation or soil. (CBD-8)

Response: *The suitability determination for the plan and action alternatives excluded areas with high erosion hazard and steep slopes, as well as wilderness areas (withdrawn), which contain the only perennial streams. Additionally, timber suitability was evaluated for each of the alternatives to determine "areas where management prescriptions could not be met." This resulted in alternatives with varying acres of suitable timber.*

The identification of an area as suitable for a particular use or uses is guidance for project and activity decision making, and is not a commitment or a final decision and does not mean that a particular use will or will not occur in the area. When projects are proposed under plan implementation, the appropriateness of timber harvest would evaluate and address site-specific resource concerns such as the presence of intermittent streams or wetlands, roadless areas, lands directly impacted by high-severity fire effects, and habitat for species that are threatened, endangered, proposed, rare, endemic, management indicator, or otherwise of concern.

Comment: Lands designated as suitable for timber production will be managed with the assumption that sustained biomass production and harvest for economic purposes is a primary objective whether or not it is compatible with other goals such as wildlife habitat or restoration of fire-adapted ecosystems. (CBD-7a)

Response: *This is not true. Timber harvests do not take precedence over other goals (desired conditions) in the revised plan. There is a guideline in the revised plan and action alternatives requiring that timber harvests are carried out "in a manner consistent with maintaining or making progress toward the desired conditions in this plan." This ensures they are compatible with other goals such as wildlife habitat, watershed conditions, and the restoration of fire-adapted ecosystems. "Land Suitable for Timber Production" does not imply that management will be focused on maximizing timber yields, only that periodic harvests are expected to occur as a tool for meeting and maintaining desired land conditions.*

Comment: Appendix B states that the VDDT model assumes a regulated stand condition in areas "Suitable" for timber production. "Although not explicit in the model, it is also assumed that an effort would be made to regulate stands so that they are uneven-aged and have a generally balanced representation of age classes." The desired conditions only generally mention maintaining age classes over time. What is the definition of a generally balanced representation of age classes? (SC-101)

Response: *A generally balanced representation of age classes would include approximate representation (by percent of area within each stand) of at least three broad age classes: regeneration or young, mid-aged, and mature. In the revised plan, this is provided for in the guideline that states "Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained."*

Comment: Three hundred thousand acres of the conifer forests have been identified as not suitable for timber production; this could put these forests at risk. (JK-1)

Response: *Areas "not suitable for timber production" may still receive harvests to achieve the project-level desired conditions, but they are not managed with the intent of mechanical entry on a regular interval that would contribute to the sustained yield of timber over time or maintaining an approximate balance of tree age classes. The guideline in the Forestry and Forest Products section of the revised plan states that "on lands classified as not suited for timber production, timber harvesting should only be used for making progress toward desired conditions (for all resources and uses) or for salvage, sanitation, public health, or safety."*

Comment: Table 1 (page 19) of the DEIS shows the outputs related to timber harvest for alternative D as zero. This is confusing because the language in the alternative descriptions that states, "Mechanical thinning would be used initially to restore the desired forest structure." (SC-88) The DEIS shows that the mechanical thinning acres for ponderosa pine and frequent-fire mixed conifer are the same under all alternatives, but does not explain why the outputs in terms of allowable sale quantity (ASQ) and long-term sustained yield (LTSY) are different. (SC-82)

Response: *We added a footnote to table 1 in the EIS, explaining that ASQ and LTSY are only calculated from lands classified as suitable for timber production. Also, LTSY is a concept that implies an average yield in perpetuity from regular cutting cycles or rotations. One treatment provides one-time yield of products, but not LTSY.*

Forestry and Forest Products

Comment: There are only three sawmills left within log haul distance of the North Kaibab, all of which are at risk of loss if the preferred alternative is not implemented soon. These mills help to

achieve the desired conditions on the ground. If we don't act soon, Mother Nature will destroy the timber stands and associated flora and fauna. (JK-2)

Response*: The desired conditions for forestry and forest products states that a " sustainable supply of wood is available to support a wood harvesting and utilization industry of a size and diversity that can effectively and efficiently restore and maintain the desired conditions for ponderosa pine and frequent-fire mixed conifer communities. Large projects are currently being prepared on the North Kaibab Ranger District under the existing forest plan that will yield wood products available for public contracting and purchase. This will continue under the revised forest plan.*

Comment: The proposed planning area is adjacent to several forest-dependent communities that stand to gain significant financial benefits from the direct and indirect effects from natural resource management, through employment and local business sustainability. (KCC-1)

Response: *We recognize the Kaibab NF's roles and contributions it makes to local communities. With implementation of the Kaibab NF restoration objectives in the proposed plan, income and employment are expected to increase substantially. See EIS tables 53, 54, and 55.*

Comment: How do the guidelines for firewood gathering link with the desired future conditions for major vegetation community types? The guidelines do not have size (or location) restrictions for dead and downed firewood gathering. (SC-60)

Response: *Personal and commercial fuelwood is to be consistent with the desired conditions for the particular area. All fuelwood gathering that receives site-specific NEPA analysis is managed through permits, which can be tailored as needed to meet any site-specific resource concerns.*

Comment: Firewood removal should be excluded from PACs, PFAs, and the Kaibab Squirrel Area. (SC-61)

Response: *There already are guidelines that limit disturbing activities near PACs and PFAs and desired conditions to provide for key habitat components. Under Threatened, Endangered, and Sensitive species, guidelines state that "project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plan; Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species.." The Kaibab Squirrel National Natural Landmark (NNL) designation is not a land withdrawal and does not direct or prohibit any activity. The needs for the NNL are addressed in the forestwide direction for the ponderosa pine vegetation type. There has been no evidence that legal firewood removal has adversely affected Kaibab squirrel habitat.*

Comment: The term "moulding" instead of "molding" should be used to refer to the wood product used for decorative purposes. (PR-1)

Response*: We changed the spelling of this word in response to this comment.*

Energy Transmission and Development

Comment: The Kaibab should aim for consistency with Coconino County's guidelines when considering new energy projects. (SC-62)

Response: *The Forest Service has agency-specific guidance in law, regulation, and policies established at the national level. When considering new energy projects, the Kaibab NF seeks consistency with the county guidelines (Coconino, Yavapai, and Mohave), but if there are conflicts with Federal laws, regulations or policy, Federal guidance takes precedence. We added language to the plan in the management approach section for energy transmission and development to work with the counties to ensure consistency where practicable.*

Comment: The plan should refer to the recommendations by the Avian Powerline Interaction Committee for new and retrofitted powerlines (DOI-21). Add standards from the Avian Power Line Interaction Committee (APLIC) standards for any above ground transmission lines (AGFD-39). Add a DC that makes reference to energy development that is in balance with other resources being managed such as wildlife. (AGFD-40)

Response: *The management approach section of the plan now states "work closely with the AGFD and Federal agencies to incorporate the Avian Power line Interaction Committee recommendations for new and retrofitted power lines". The suggestions to include the standards from the APLIC were not incorporated into the revised plan. The APLIC is a tool used during the analysis of any new proposed power line and mitigation would be done at a project level. Adding this desired condition to balance with other resources would be redundant because there is already the following desire condition: "Energy transmission and development on the Kaibab National Forest meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area."*

Comment: We would like the plan to have a guideline that makes direct reference to working with USFWS and AGFD for reducing impacts to wildlife from energy development. The forest should indicate to developers at the Plan level that it is essential to work with wildlife agencies early in the process. (AGFD-41)

Response: *This suggestion was not incorporated due to it not meeting the requirements for a guideline. However, in the wildlife section for management approach for wildlife it references the need to work with USFWS and AGFD along with other federal, state and non-government groups on the management of wildlife species.*

Minerals and Mining

Comment: The recent Canyon Mine decision is not consistent with the desired conditions and guidelines in the proposed plan (HOPI-3)

Response: *The Canyon Mine decision was consistent with the forest plan that was in place at the time of the decision. Decisions must be consistent with the plan in place at the time they are signed, and as a rule, are not revisited.*

Comment: The plan should include a set of defensible standards to prevent an overbearing industry representative or permittee from insisting that mining is good for the landscape. (EBR-41b)

Response: *The plan contains standards and guidelines aimed at minimizing adverse impacts from mineral extraction and mining activities on sensitive forest resources. Most of the guidance for*

mining is governed by law, regulation, and policy, which are outside of the scope of the forest plan. The Kaibab NF follows the NEPA process in permitting new mineral extraction and mining activities, and all individuals have equal standing and opportunity to comment on projects and raise issues about the potential effects of mineral extraction and mining activities.

Arizona Bugbane Botanical Area

Comment: The revised plan should fully incorporate and integrate the May 1995 Arizona bugbane (*Cimicifuga arizonica*) Conservation Assessment and Strategy into the "Guidelines for the Arizona Bugbane Botanical Area." (DOI-10)

Response: *We reviewed the conservation agreement to ensure that the plan-level strategies were addressed. The plan does contain desired conditions and guidelines that reflect the guidance in the agreement. One guideline was added that had previously only been implied that "Wildfires in the Botanical Area should be suppressed when high severity fire is anticipated and it is safe to do so." Additionally, the plan references the conservation agreement between the Fish and Wildlife Service and Forest Service for the Arizona bugbane in appendix B under other law, regulation, and policies.*

Double A Wild and Free Roaming Burro Territory

Comment: The number of burros maintained in the Double-A Wild Burro Territory should be modified to account for that fact that fertility treatments increase lifespan of equines (Turner and Kirkpatrick 2002). (SC-65)

Response: *The plan guidance for the Double A Wild Burro Area states that a "biologically sound and genetically viable burro population is in balance with native wildlife, permitted livestock, and other resource values" and that "population control measures should be implemented to maintain genetic diversity and desired resource conditions in the area." The potential lifespan of burros is a consideration that would be relevant to project planning and potential management activities achieving the desired condition, but is outside the scope of the forest plan decision.*

Comment: All wild horse and burro populations near Grand Canyon National Park should be carefully monitored to be sure that animals are not travelling toward the park. (SC-66)

Response: *The Double A Burro Territory is approximately 50 miles from Grand Canyon National Park. We have no information indicating that these burros travel anywhere near the park boundary. If it is necessary to monitor these populations, it might be done to support day-to-day management, but it is not within the scope of the plan because it is not responsive to and does not directly address any plan components.*

Comment: We would like to see an objective to reduce the burro population in the Double A Wild Burro Area below the permitted number by a specified time. (AGFD-44)

Response: *The Forest Service coordinates management of the Wild Horse and Burro program with the Bureau of Land Management including maintaining the desired burro herd size. The plan established objectives for only the greatest resource needs and considered the anticipated budget and capacity for the plan period.*

National Scenic, Historic, and Recreation Trails

Comment: In the National Recreation Trail section of the plan there is an error, “National Scenic Trail” should be changed to “National Recreation Trail.” (SC-67)

Response: *We agree and have made the correction.*

House Rock Wildlife Area

Comment: Bison hybrids should be confined to the Buffalo Ranch MA to protect montane/subalpine grasslands and the semi-desert grasslands outside of the Buffalo Ranch MA. (SC-39, SC-41) Bison hybrids and Rocky Mountain elk are both nonnative and their continued presence could take a heavy toll on forest resources. Management direction is needed for these species to minimize their impacts. Coordination is needed with neighboring Federal land managers (i.e., Grand Canyon National Park) to ensure that these nonnative wildlife species do not harm forest resources, or those on adjacent Federal lands. (LS-19, WILD-15)

Response: *Point of information: The “Buffalo Ranch Management Area” is now called the “House Rock Wildlife Area.” It has been referred to as the House Rock Wildlife Area for several years, but the forest plan language had not been updated to reflect it. The Kaibab NF recognizes that there are resource concerns associated with bison outside the House Rock Wildlife Area. The proposed plan contains two guidelines that address this concern: “The bison herd should be managed to be concentrated within the House Rock Wildlife Area,” and “Active management should be used to minimize impacts from bison to sensitive resources, particularly outside the House Rock Wildlife Area.” Currently, there are bison on the Kaibab Plateau and in Grand Canyon National Park. We clarified this concern by adding language to the management approach for the area which now states “Coordination and cooperation between the Kaibab NF, AGFD, Grand Canyon National Park, and researchers will be needed to identify workable solutions for managing the bison which are now spending much of their time on the remote forested points of the Kaibab Plateau. Efforts to achieve the desired conditions will likely be phased with the initial emphasis to reduce the herd size and to exclude them from Grand Canyon National Park. Strategies may include intensive hunting and trapping, fencing, and herding.”*

Comment: The buffalo desired condition should be revised for accuracy. The MOU for bison management does not specify a maximum herd size. Similarly, the guidelines state that bison "should be confined' to the area identified in MOU, but the MOU does not define an area to which the bison must be confined. (AGFD-49)

Response: *We agree and the corrections have been made. The desired condition now reads “The bison herd size is in balance with ecological conditions in the House Rock Wildlife MA.” The guideline now reads “The bison should be managed so that the herd is concentrated within the House Rock Wildlife MA.” Note: the management area name was changed from the “Buffalo Ranch Management Area” to the “House Rock Wildlife Management Area” in the final revised plan.*

Pediocactus Conservation Area

Comment: The revised plan should fully incorporate and integrate the October 1996 Paradine Plains Cactus (*Pediocactus paradinei* B.W. Benson) Conservation Assessment and Strategy into the "Guidelines for the Pediocactus Conservation Area." (DOI-9)

Response: *The conservation agreement for the Paradine plains cactus is currently being updated and we anticipate that the agreement may be updated again during the life of the plan. As a result, the plan references the conservation agreement rather than incorporating and integrating its components.*

Comment: The Kaibab Plains Cactus Conservation Area should only allow low-intensity surface fires, or fires be suppressed if conditions lead to higher intensity fire. (DOI-13)

Response: *We added a guideline to the plan stating that "Wildfires in the Pediocactus Conservation Area should be suppressed when high-severity fire is anticipated and it is safe with respect to firefighter safety."*

Research Natural Areas

Comment: There should be research natural areas designated for each of the major habitat types on the forest, as well as selected natural ponds/lakes, springs, and caves. (LS-22, WILD-27)

Response: *Research natural areas (RNA) are a type of special area within the National Forest System (NFS), designated for their unique or special characteristics with the intent that they be designated for the purposes of research and establishing reference sites. They are established and managed jointly by the Kaibab NF and the Forest Service (Rocky Mountain) Research Station. Guidance for selecting and establishing RNAs within the NFS primarily comes from Forest Service Manual direction (FSM 1920 and FSM 1950). The NFS objective is to have an effective ecological distribution of RNAs across major climate gradients and biophysical settings (potential natural vegetation types or PNVTs). In identifying RNAs, we considered the distribution of existing RNAs within the region (inside and outside the agency), specifically looking for underrepresented vegetation types where there was little evidence of major human disturbance. There is no intent for RNA representation for each major habitat type on an individual forest. We evaluated two areas for RNA potential and neither met the conditions appropriate for establishment. If, in the future, the Kaibab NF or forest research station identifies an area that meets the RNA intent and criteria, it may be evaluated and recommended at that time. A full description of the Kaibab NF RNA analysis can be found in appendix G of the EIS.*

Comment: It is unclear why Garland Prairie does not qualify as a Research Natural Area. (LS-14-WILD-28)

Response*: Garland Prairie was evaluated but not recommended as a potential RNA because (1) the montane grassland PNVT is not an underrepresented vegetation type, (2) it does not contain sensitive species or unique ecological features, (3) its proximity to I-40 and the railroad interrupts the potential for natural processes (fire) from playing their natural role, and (4) it is currently encroached by trees and contains nonnative invasive plants that would benefit from treatment. Documentation of the RNA evaluation process can be found in appendix G of the EIS.*

The Kaibab NF does recognize the importance of the Garland Prairie Management Area as a reference site and its value for research.

Comment: North Canyon hosts a remarkable array of unique species and should be the subject of intensive inventory and considered as a candidate for Research Natural Area (RNA) status. (LS-6)

Response: *While we agree that North Canyon contains unique species and has high biological values, it was not considered as a RNA for two primary reasons: 1)Mixed conifer vegetation is already well represented in the system of RNAs and need was the first filter used in the RNA evaluation process; 2) North Canyon is in the Saddle Mountain wilderness where it will already be managed to maintain its pristine condition.*

Economics

Comment: The DEIS did not discuss the benefits and costs of alternate strategies. (EBR-5)

Response: *The EIS discussed the costs and benefits of the alternate strategies (alternatives) that were proposed or developed in response to issues raised. This analysis can be found in the Economics section of the EIS in Chapter 3.*

Comment: The DEIS should discuss and look at different ways of meeting or maximizing net public benefit as required by NFMA. (EBR-38, CBD-1)

Response: *Section 219.1 – Purpose and principles - (a) states that the plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net benefits in an environmentally sound manner. Section 219.3 defines net public benefits as: "An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by quantitative and qualitative criteria, rather than a single measure or index such as Present Net Value (PNV)."*

We developed alternative ways to maximize net public benefit in response to comments received and alternatives evaluated in the EIS.

Costs and revenues, by program area (including range, wildlife, watershed, and recreation) appear in tables 56 and 57 in the FEIS. The PNVs, by program area and alternative, are shown in table 58. Alternative B is the most financially efficient based on PNV . The identification of the alternative that comes nearest to maximizing net public benefits is determined by the deciding official in the record of decision based on all effects including PNV, multiple uses, environmental and social factors that are displayed in the EIS.

Comment: The economic analysis should provide detailed information about the contributions, values, and revenue generated from different recreation activities as well as the costs associated with administering such activities. (RE-6)

Response: *Information on the contribution to income and employment from the Kaibab NF recreation program was factored into the IMPLAN[1] economic analysis and is displayed in table*

[1] IMPLAN (IMpact analysis for PLANing, Minnesota IMPLAN Group, Inc.) is a regional economic impact analysis

51 of the EIS. The costs, revenues, and PNV associated with the recreation program appear in tables 56 through 58. The costs for all program areas, including recreation, exceed revenues (dollars) received.

Comment: The economic section should provide an honest assessment of returns to the treasury and costs to the public about livestock grazing. (EBR-23)

Response: *The cost and revenues by program area are reported in the economic section of the plan. Detailed analysis of the grazing program was not provided because there was no difference between alternatives with respect to grazing.*

Comment: Timber suitability designations must apply a cost-benefit analysis and "stratify" national forest lands by allowable timber management intensity (1604 (k). (CBD-6)

Response: *Table 59 in the EIS displays a benefit-cost analysis by various forest resources and by alternative. Table 59 presents present net value (PNV) by program area and alternative. PNV is the difference between program revenues (benefits) and program expenditures (costs) over a 10-year period, using a 4 percent discount rate. All alternatives result in a negative PNV. Alternative A is the least negative, while alternative D has the highest negative PNV. The differences in PNV for the alternatives are a function of the presettlement tree in guideline in alternatives C and D as well as differing acres of suitable timberland. The process for identifying suitable timberland classifies types of unsuitable lands (withdrawn/wilderness, non-forested, irreversible resources damage, etc.), but does not have differing levels of allowable timber management intensity. The amount and intensity of timber harvest depends on the needs to achieve or maintain desired conditions and is made following site specific analysis.*

Comment: The economic analysis should provide detailed information about the consumptive and non-consumptive wildlife opportunities. (RE-5)

Response: *Information regarding recreation opportunities (including those related to wildlife) is found in the Recreation section of the EIS. The economic analysis (efficiency and impact analysis) includes those activities associated with wildlife. See EIS tables 51, 56, 57, and 58.*

Comment: The FEIS should provide more detailed analysis about the costs and effects of grazing by nonnative ungulates on the limited forage and water for wildlife, soils, species composition, plant vigor, natural fire, and aspen so that the public may provide meaningful input into Forest Service decisions affecting this private-commercial use and competition for limited resources and the deciding official can consider the financial costs verses impacts to native species and ecosystems to determine the highest and best use of forest resources. (RE-7)

Response: *When the Kaibab NF gathers utilization information on the amount of forage consumed by grazing, it does not distinguish between livestock and wildlife. It is not possible to determine how much is grazed by which species. The financial costs and revenues associated with livestock grazing on the Kaibab NF are part of the range, watershed, and wildlife program.*

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system that uses county level, input-output data to determine the extent to which these activities (such as livestock grazing) contribute to the local economy. Input-output analysis is an economist's tool that traces linkages among the structural parts of an economy and calculates the employment, income, and output effects resulting from a direct impact on the economy.

Activities conducted under this program often are designed to improve range and watershed condition for both livestock and wildlife simultaneously.

Comment: There are errors in acreage on table 53 that carry over to table 55. This underestimates the socio-economic benefits and outputs. (KCC-4)

Response: *We agree and have made the corrections in the FEIS.*

Comment: The short-term financial benefits of timber harvest fails to offset the long-term costs of loss of soil productivity, compaction, exposure, erosion, reduced habitat quality, etc. These effects should be analyzed in a cost-benefit analysis. (CBD-7b)

Response: *Table 58 displays revenues by alternative. Table 59 displays present net value (PNV) by alternative, which is a cost benefit or financial efficiency comparison. PNV is the difference between program revenues (benefits, and program expenditures (costs). These tables do not apply monetary values to positive and negative environmental effects of the alternatives. Chapter 3 of the EIS discloses the positive and negative short- and long-term effects of mechanical harvesting for the specified affected resource areas including the approximate costs. The selected alternative focuses on restoration of ecosystem resiliency, in ways that enhance protection of watersheds, soils, habitat and other resources. Implementation of the preferred alternative will not result in long term loss of soil productivity or habitat quality.*

Monitoring and Adaptive Management

Comment: The EIS for plan revision is an appropriate vehicle for proposing monitoring protocols that can be reliably implemented to support restoration-focused adaptive management. (CBD-70)

Response: *We agree that forest plan monitoring provides the mechanism to enable and support restoration-focused adaptive management. Chapter 5 of the plan identifies the monitoring questions to be answered; however, the protocols and methodologies for answering those questions are not specified in the plan, but in a supporting monitoring and implementation guide. This is to ensure the plan is flexible and responsive to new information, emerging issues, and recommended changes to protocols without requiring a plan amendment. See the plan, chapter 5, Monitoring and Evaluation introduction section.*

Comment: The monitoring plan can only be judged based on how well the last one worked. In many, many cases planned monitoring never occurred. (EBR-19)

Response: *Forest plan monitoring occurs on an annual basis and is reported in the annual monitoring reports, which may be found on the Kaibab NF website at http://fs.usda.gov/goto/kaibab/plan_revision. Not all monitoring items are required every year, and some of the monitoring items identified in the original forest plan were never appropriately funded and did not inform achievement of plan components.*

Comment: Neither the proposed plan nor the current one has any consequences if monitoring does not get completed. It is arbitrary and capricious to rely on monitoring to drive future actions when it does not always occur. (EBR-20, EBR-21) How will the Forest Service ensure that monitoring and enforcement are maintained given limited funding and resources? (SC-69)

Response: *There are legal requirements for conducting a wide range of resource-related monitoring. However, the monitoring plan is based on the Kaibab NF's intent based on an assumption of recent and relatively stable budgets. Within that context, the Kaibab NF is committed to integrating monitoring with its management decisions as discussed in chapter 5 of the plan. By focusing on effectiveness monitoring and movement toward desired conditions, the Kaibab NF will be better able to assess future actions. If funding is significantly decreased, it is expected that both monitoring and implementation would be less than what is planned. Allocation of monitoring funds is outside the scope of the plan and EIS.*

Some monitoring requirements and consequences vary by resource area, and are often driven by other law, regulation, and policy, and regulation, which is outside the scope of the plan and EIS. If funding for monitoring is lower than in recent years, the monitoring plan may need to be adaptively adjusted to reflect the new funding levels.

Comment: The plan states that a more prescriptive monitoring implementation guide will be developed later. This needs to be developed first and revealed to the public. (EBR-28)

Response: *The relevant monitoring questions are specified in the plan, but the specific procedures, methods, and analysis are necessarily developed and maintained outside the plan so that they may be adjusted as necessary to reflect current science and analysis. A draft monitoring implementation guide for some of the monitoring plan questions (e.g., rapid plots) is available on the Kaibab NF planning website at http://fs.usda.gov/goto/kaibab/plan_revision). This implementation guide was developed collaboratively using the best available science, and will be refined and evaluated over time as it is implemented.*

Comment: The forest should build a large-scale ecosystem conceptual model. Such models have been developed for other forests and ecosystems throughout the West, and provide essential information about data gaps, climate-related changes in productivity, and ecological linkages that may greatly help improve monitoring and adaptive management. (LS-7, WILD-3)

Response: *While a specific large-scale conceptual model was not built for this plan revision, we used a comprehensive and integrated approach. We recognize the value of such models and invite the commenter and others to help build such a model that would serve to guide future management and plan implementation over time; however, this is outside the scope of the plan decision.*

Comment: Given that ecosystem management based on natural disturbance regimes will always be somewhat uncertain, conservation biologists urge use of the precautionary principle. As a result, restoration should target areas most likely to benefit from active intervention and be confined to small spatial scales and accompanied by monitoring and evaluation sufficient to inform adaptive management. (CBD-69)

Response*: There is strong scientific support for restoring ponderosa pine ecosystems in the Southwest, and the effects are well known. The risks of loss associated by doing nothing often outweigh the potential short-term adverse effects of thinning and burning. While there is a lot of variation as mixed conifer vegetation ranges from the warmer/drier sites to cool moist sites and there are fewer peer-reviewed studies for restoration of mixed conifer compared to ponderosa pine, the effects are not unknown. In recognition that there is a level of uncertainty, the revised plan does exercise the precautionary principle as demonstrated by the guideline that "vegetation management activities in mixed conifer forests should incorporate experimental design features*

and monitoring to accelerate learning and adaptive management." The relevant spatial scale and size of a project depends on the objectives and questions asked; there is no one-size fits all answer. These site-specific questions must be determined at the project level and are outside the scope of the plan and EIS.

Additionally, there are, however, several monitoring questions in chapter 5 of the plan responsive to proposed forest restoration efforts at the forestwide level that were developed to evaluate the effects and effectiveness of treatments, facilitate learning, and help to enable adaptive management.

Comment: Periodic assessments of wilderness areas are needed to ensure that valued species and habitats remain sustainable, and that such areas are not subject to nonnative species invasions. (LS-26)

Response: *The plan does contain objectives for monitoring for trails and campsites in wilderness and for noxious weeds. Additional wilderness and weed monitoring outside the forest plan monitoring is conducted as funding and resources are available.*

Comment: There is currently a monitoring question "does habitat configuration provide functional connectivity for pronghorn?" We recommend also considering a corollary for closed habitat conditions such as black bear or grey fox. (AGFD-33)

Response: *We added language to the desired condition statement to ensure it is clear that functional connectivity is desired for closed-canopy species as well. A corollary question was not added to the monitoring plan because questions were developed to be within the capacity of the existing budget. Evaluating functional connectivity for pronghorn is a higher priority because it directly relates to a priority need for change and pronghorn is also a management indicator species.*

Additionally, the rapid plot and remotely sensed forest structural data collected to address other monitoring questions will be used to answer questions for species with closed-canopy needs.

Comment: The monitoring plan matrix asks the question 'how many acres of the forest is in an uneven aged open state at the midscale (above 100 acres)? While presettlement evidence suggests that this would be the dominant condition at the midscale, we know that patches of forest in an uneven aged "closed" state existed at the fine scale and perhaps in some small proportion at the midscale because wildlife that depend on those conditions are still present today. We suggest adding a monitoring question that addresses and tracks this issue (AGFD-53)

Response: *The monitoring plan focused on those questions that were most important to answer to determine the effectiveness and or need for change in management (e.g. reducing the threat from uncharacteristic wildfire) across the forest. The question 'how many acres of the forest is in an uneven aged open state at the midscale (above 100 acres)?" informs achievement of specific mid-scale desired conditions (the mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present). The fine scale desired conditions include wide ranges and variability between groups. If specific questions related to specific wildlife species arise, and there is a need to further characterize the amount and arrangement of the open and closed patches at the fine scale it could be done at the project level using stand exam and or rapid plot data. Rapid plots are designed to capture data at the fine to mid-scale. A complete description of the rapid plots and associated monitoring questions and sampling methodology*

can be found in the "Rapid Plot Monitoring and Statistical Guide". While not part of the forest wide monitoring plan, this document was developed to help with its implementation. It can be found on the Kaibab NF website:
http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5438937.pdf

Comment: We would like to see greater emphasis on oak and specific monitoring objectives to address oak separately from general ponderosa pine forest. (AGFD-50)

Response: *While there are no monitoring questions in the plan specific to oak, the rapid plot protocol mentioned in the preceding response (which is more detailed and not in the plan) does collect data that would inform the plan desired conditions for oak which acknowledges its importance for wildlife.*

Comment: We recommend separating the two vegetation (ponderosa pine and frequent fire mixed conifer) types in terms of monitoring questions, metrics, and methods to assess progress toward desired conditions in each type. (AGFD-51)

Response: *The questions for ponderosa pine and frequent fire mixed conifer are only combined because the questions are relevant to both resource areas. Each vegetation type would be assessed separately because they have differing desired conditions.*

Comment: Consistent with our recommendation to consider the full range of aspen treatment methods, we suggest including additional monitoring metrics and objectives that relate to other treatment methods. (AGFD- 52)

Response: *The monitoring plan questions for aspen are limited to achievement of desired conditions and objectives in the plan. Questions related to treatment effectiveness are project-level or research in nature.*

Comment: Consistent with our recommendation to consider the full range of aspen treatment methods, we suggest including additional monitoring metrics and objectives that relate to other treatment methods. (AGFD-14)

Response: *We agree this is an important consideration to include in project design, particularly if some of the goals are to evaluate experimental treatments and effects on aspen recruitment. However, these additional monitoring metrics, treatment methods, and objectives will be considered at the project level, and are outside the scope of the plan and EIS.*

As described in chapter 5 of the plan, the monitoring plan is adaptive in nature, and additional plan-level monitoring metrics or questions may be deleted, added, and or modified over time as our understanding about forest management evolves.

Comment: Chapter 5, table 5 of the draft plan includes the monitoring question "Are Mexican spotted owls present in PACs?" We recommend also asking the question "Do Mexican spotted owls occupy potential nest/roost habitat?" (DOI-6)

Response: *The Kaibab NF monitoring plan commits to monitor and report on PAC occupancy at regular intervals. The Kaibab NF did not include this question because it does not consistently have the resources to broadly monitor potential nest and roost habitat on regular intervals. Nest and roost habitat and occupancy monitoring is typically conducted where it is potentially affected by project actions as agreed upon during the consultation process with the USFWS.*

Comment: The Forest Service should monitor aquatic macroinvertebrates in areas that might be at risk from uranium contamination. This is especially important since hikers frequent Kanab Creek and several use water from the creek or nearby springs for drinking and bathing. (SC-104)

Response: *Water quality and spring inventories and monitoring have been and will continue to be conducted on the Kaibab NF. Determining the biological pathways for uranium contamination is a research question that would need to be refined, tested, and validated. This is outside the scope of the plan and EIS.*

Comment: The monitoring plan should include registration boxes at back country airstrips to track the numbers, frequency of use, and seasonal statistics. (RAF-7)

Response: *There are currently no back country airstrips on the Kaibab NF, and therefore no need to monitor use.*

Climate Change

Comment: The Forest Service should recognize and disclose changes in climate and the implications for natural resource availability and multiple-use for current and future generations. (CBD-10)

Response: *The revised plan for the Kaibab NF does address changes in climate and the implications on land management planning. See appendix D of the plan for a summary of the Kaibab NF's approach to climate change for plan revision. Climate change is addressed directly in the revised plan in the management approaches and the monitoring plan where appropriate. Climate change is addressed indirectly throughout the plan through desired conditions that represent elements of functional ecosystems and resilient landscapes.*

Comment: The EIS must assess and disclose the potential contribution of managing multiple uses and activities that may contribute to or compound changes to climate systems including but not limited to groundwater extraction, surface water diversions and withdrawals, road use and construction, livestock grazing, fire and fuels management, mining, logging, and invasive species spread. (CBD-52)

Response: *Multiple use and other activities are consistent with desired conditions for other plan resource areas and were considered in the effects analyses. Further, the plan components were developed to account for climate change such as resilience and adaptability (plan appendix D). Therefore the plan components assessed and disclosed in the FEIS account for climate change effects in the respective resource areas. Climate change is discussed throughout the EIS. See the Species Viability, Watersheds and Soils, Water Resources, Livestock Grazing, and Vegetation and Fire Sections for additional discussion.*

Comment: Forest management can help mitigate global warming by helping to avoid emissions and by helping our forests grow. The EIS should consider and disclose the potential environmental consequences associated with continued commercial harvests. (CBD-53)

Response: *Additional analysis has been added to the FEIS that discloses the potential environmental effects and compares alternatives with respect to carbon storage and sequestration. The analysis indicates that the plan (proposed action) is most effective at sequestering and storing carbon because it reduces the risk of uncharacteristic stand-replacing*

fire and reduces competition, which increases tree growth and carbon sequestration. Additionally, perennial grasses sequester more carbon when they receive more light, which more than offsets the soil carbon loss that occurs when temperatures rise as a result of exposure. Commercial harvests that result in creation of durable wood products can store carbon over long timeframes (Huang et al. 2013, Hurteau and North 2009).

Comment: A recent report from the Food and Agriculture Organization of the United Nations found that livestock are responsible for eighteen percent of all greenhouse emissions. Livestock grazing is widespread on NFS lands and the contribution of grazing to climate change must be assessed and disclosed. (CBD-54)

Response: *Concentrated animal feeding operations (feedlots which may have 50,000 + head) are known to contribute to CO2 emissions because they have high concentrations of decomposing manure being stored in large quantities, which releases methane and CO2 into the atmosphere. Grazing on the Kaibab NF is very distributed and the number of livestock on forest at any given time is minimal. Additionally, manures are not composted. They are dispersed, and when , they decompose, they contribute to soil organic carbon and are available as soil nutrients for plants for uptake and carbon sequestration. This offset, results in total emissions being extremely low and was therefore not included in the EIS. Additional documentation was added to the project record.*

Comment: The EIS must address the emerging issue of biomass and how the biomass industry could affect the national forest and climate change impacts. (CBD-57)

Response: *The plan components were developed considering climate change and climate effects (see appendix D of the plan), and these effects were evaluated in the EIS. The plan and EIS address biomass utilization indirectly, recognizing that biomass utilization would help accomplish the objectives of the plan. The biomass industry and its effects on climate change and national forests are outside the scope of the analysis.*

Comment: The EIS must consider any oil and gas development. The ultimate burning of these fossil fuels would further increase global warming pollution. (CBD-56)

Response: *The plan does not propose any oil and gas development. Although the plan does have areas that are considered "available," there are no oil and gas leases on the Kaibab NF and the development potential is very low. As a result, the indirect effect of burning fossil fuels was not discussed. See EIS Minerals and Mining Affected Environment section.*

Glossary

Comment: The EIS should explicitly define its use of the terms "sustainable" "appropriate," "restore," "resilience." (CBD-67)

Response: *The EIS glossary does contain definitions for "sustainability," "resiliency," and "restoration". The EIS uses the term "appropriate" consistent with the traditional definition, which may be found in any standard dictionary.*

Comment: The draft Kaibab Plan and DEIS should have easy-to-find definitions for the different thinning prescriptions referenced (e.g., matrix thinning, all-size free thinning, group selection, etc.). (SC-24)

Response: *We added these terms to the glossary*

Comment: The glossary contains a definition for goshawk foraging areas, but the wildlife desired conditions and guidelines do not mention foraging areas or a structural condition to be achieved. (SC-71)

Response: *We removed the definition for goshawk foraging areas from the glossary because the term is not used in the revised plan. The concept of foraging areas also did not appear in the amended 1996 plan.*

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Commenter Codes

Below is the list of agencies, tribes, groups, and individuals who provided substantive comments to the DEIS and Draft Revised Forest Plan. The codes and sequential comment number were used for tracking between this appendix (A) and the original comment, which can be found in the project record.

ADEQ= Arizona Department of Environmental Quality

ADOT= Arizona Department of Transportation

AGFD= Arizona Game and Fish Dept.

AQ= Anthony Quintile

BB= Bob Blasi

CBD= Center for Biological Diversity

DH= Dorothy Holasek

DOI= Dept. Of Interior-Office of Environmental Policy and Compliance

EBR= Erik B. Ryberg

EPA= Environmental Protection Agency

FRE= Town of Fredonia

GR= Glenn Rink

HOPI= The Hopi Tribe

JK= Jim Koons

KBPI= Kaibab Band of Paiutes

KCC= Kane County Commissioners

LS= Lawrence Stevens

MK= Mike Kearsley

PR= Patrick Rappold

RAF= Recreation Aviation Foundation

RE= Rick Erman, Friends of Anderson Mesa

SC= Sierra Club-Grand Canyon Chapter

SN= Sue Nikopol

TS= Tracy Swensen

WILD= Wildlands Council/WildEarth Guardians/GOBW/GRW

Appendix B. Methodologies and Analysis Processes

The methods and analysis process section supplements the methods in the effects analysis for the DEIS, chapter 3. This supplemental information provides increased transparency for the processes, assumptions, and logic used in what are necessarily complex analysis processes. Descriptions of the required analysis for timber suitability, annual sale quantity (ASQ), and long-term sustained yield (LTSY) calculations, livestock grazing capability and suitability, potential wilderness area evaluation, wild and scenic river assessment, research natural area assessment, are located in appendices C, D, E, F, and G.

Vegetation, Fuels, and Fire

The vegetation analysis models the potential vegetation conditions resulting from natural disturbances and succession in conjunction with proposed management (human disturbances) for each of the alternatives. A major portion of this analysis is based upon changes in vegetation state as a result of disturbances. Each vegetation state within a potential natural vegetation type (PNVT) is a combination of the dominant plant canopy cover class and (for forest and woodland) size class and density class. The evaluation focused on ecosystem functions (such as the amount of forest providing "old growth", robust understory or high interspersion of vegetation states) associated with the priority needs for change. The analysis served as the basis for several other resource assessments including species habitats, soil and watershed condition, air quality, and social and economic uses. A number of sources were used to display current conditions. Various models were used to predict trends in vegetation and disturbances in response to natural and anthropogenic forces by alternative. Alternatives were evaluated by their progress toward priority needs for change and associated desired conditions.[1]

The primary sources for existing vegetation conditions are:

- A PNVT map based primarily upon the soil units from the terrestrial ecosystem survey was used to delineate all major vegetation types and compare existing to characteristic vegetation. Characteristic vegetation is the vegetation composition and structure that would exist under a natural disturbance regime, and considered to be ecologically sustainable.
- A "mid-scale" vegetation map, completed in 2008 across the Coconino and Kaibab National Forests provided geospatial polygons with characteristics of life form (tree, shrub, grass-forb), size class (for trees), and canopy cover class suitable for analysis at a scale of approximately 1:100,000.
- Forest inventory and analysis (FIA) plot data were used to calibrate the Vegetation Development Dynamics Tool model (VDDT), to estimate relative proportions of even- and uneven-aged conditions on the forest, and to estimate proportions of various vegetation types within pinyon-juniper systems.

[1] For the potential natural vegetation types modeled with VDDT on the Kaibab NF (ponderosa pine forest and frequent-fire mixed conifer) the mid-scale desired condition is assumed to be an open, multi-storied forest, dominated by trees 20 inches d.b.h., or more. In the models for these two vegetation types, this is referred to as "state K." This state can vary from 10 to 30 percent canopy cover and will have many tree sizes present, though it is dominated by trees 20 inches d.b.h. and larger. It is expected to contain a myriad of fine-scale states with the sole exception of state N (uncharacteristic large openings), provided they average out to an open forest dominated by large trees at the mid-scale of 100 to 1,000 acres.

- Field sampled vegetation data gathered on the Kaibab National Forest (NF).
- Mapped areas of stand-replacing fire on the Kaibab NF and other national forests along the Mogollon Rim for estimating the probability of occurrence for such events.

Ecosystems and the plant communities that comprise them are dynamic. Plant communities undergo vegetation changes (transitions) over time, both with and without disturbances such as fire or management by humans. In the absence of disturbance changes in plant communities also occur over time as plants grow and die and, in many cases, new species establish and become dominant (plant succession). In order to evaluate vegetation, fire, and fuels trends (the sum of many vegetation transitions over time) that are within the scope of the Forest Plan Revision, modeling was used. The primary models used are the Vegetation Development Dynamics Tool, the Forest Vegetation Simulator, and spreadsheet based models which are each described in more detail in the following narratives.

Vegetation Development Dynamics Tool

The Vegetation Development Dynamics Tool (VDDT), developed by ESSA Technologies (ESSA Technologies, LTD 2007) is widely used for modeling vegetation dynamics at landscape scales. For forest plan revision purposes in the Southwest Region, this model is applied to PNVT/forest plan alternative combinations to provide information that will aid in comparing alternative effects.

VDDT is a “state-and-transition” modeling tool which provides a framework for predicting the effects of various disturbances, including management actions that affect vegetation state changes. States within a PNVT are defined by a dominant plant or tree cover type and structural stage such as seedling/sapling, medium size trees, etc. Table B 1 lists the vegetation states used for PNVTs that were modeled with VDDT for the Kaibab Forest Plan analysis. The PNVTs modeled and the rationale for modeling only these PNVTs is discussed at the end of this section.

Table B 1. VDDT state descriptions

State	Description
A	Grass, forb, shrubland; <10% canopy cover
B	Seeding/sapling, open; <10% canopy cover
C	Small trees, open; 10-30% canopy cover; 5-10″ diameter class
D	Medium trees, open, single story; 10-30% canopy cover; 10-20″ diameter class
E	Very large trees, open, single story; 10-30% canopy cover; 20+″ diameter class
F	Seeding/sapling, closed; >30% canopy closure; 0-5″ diameter class
G	Small trees, closed; >30% canopy closure; 5-10″ diameter class
H	Medium trees, closed, single story; >30% canopy closure; 10-20” diameter class
I	Very large trees, closed, single story; >30% canopy closure; 20+″ diameter class
J	Medium trees, open, multistory; 10-30% canopy closure; 10-20″ diameter class
K	Very large trees, open, multistory; 10-30% canopy closure; 20+″ diameter class
L	Medium trees, closed, multistory; >30% canopy closure; 10-20″ diameter class
M	Very large trees, closed, multistory; >30% canopy closure; 20+" diameter class
N	Uncharacteristic state; <10% canopy cover; large openings unlikely to regenerate in a timely fashion

Without disturbance, vegetation moves (transitions) from one state to the next on a time- or probability-dependent pathway (plant succession). Many VDDT models use time-dependent pathways for succession; however an analysis documented in Weisz et al. (2011) found no single predictable successional pathway for southwestern forests. Therefore, several probability-based outcomes for plant succession were used instead of time-based outcomes. Natural or human-caused disturbances also affect vegetation transitions. In VDDT, disturbances are defined for each state according to:

- type (e.g., wildfire, thinning, insects/diseases, etc.)
- destination state (the outcome of a disturbance)
- probability of occurrence
- relative stand age (in some cases)

Figure B 1 illustrates the vegetation states and transitions in the VDDT model.

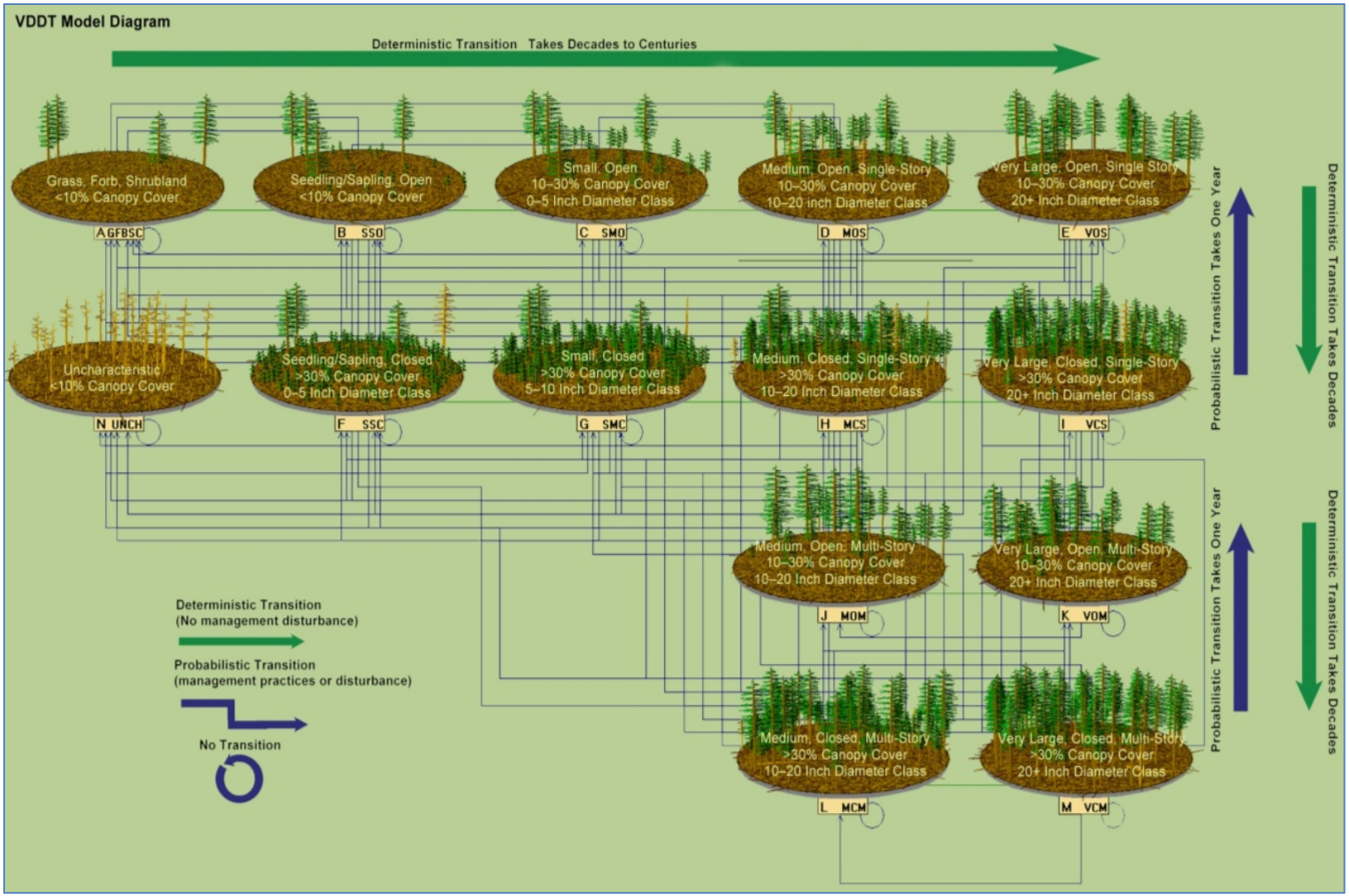

Figure B 1. VDDT state and transition model for ponderosa pine and frequent fire mixed conifer

To simulate transitions from one state to another, VDDT breaks the analysis area down into a number of equivalent sized cells (also referred to as pixels). Each cell is assigned a specific state and age. The percentage of each state within the analysis area is based on the proportion of the total number of cells within the analysis area that is found in each state at any point in time. The starting point for each model run it set up so that the percentage of cells in each state match the current conditions that were determined for each PNVT. For each simulation year VDDT cycles through the cells, generates a random number, and determines whether each cell gets a year older in the same state, moves to a new successional state, or has a disturbance applied to it that would also move the cell to a new state. Probabilities of each of these outcomes happening in the model were developed using data related to past, current, and expected actions or events.

Some of these states within a VDDT model are found within the historic range of variability (such as large, multi-storied, open-canopied forest), while others are uncharacteristic states that occur currently, but did not occur historically (such as very large openings) within the ponderosa pine PNVT. Model outputs are the ratios of the various states with the PNVT for the landscape at the end of a given time period.

The U.S. Forest Service Southwestern Region and its national forests have developed VDDT models specifically for several forest/woodland PNVTs to be used for forest plan revision in the region. The models were informed and calibrated with FIA data from across the region and stratified into PNVTs. FIA data were the best available data for making adjustments to the FVS and VDDT models. This analysis assumes that these data are representative and valid for evaluating attainment of the desired conditions and possible consequences of the plan alternatives.

A set of vegetation management prescriptions and natural disturbances were developed and modeled in FVS to predict vegetation state outcomes for each state. In most cases, more than one outcome is predicted due to the existing differences between plots within each state. The process for developing the model is documented in a white paper by the Southwestern Region, Process Overview of Using FVS to Create VDDT Models (Weisz et al. 2011).

For the Kaibab forest plan revision process, plan objectives that may have significant effects on PNVT structure or composition across the forest are proposed only for the ponderosa pine forest/bunchgrass (PPG), ponderosa pine forest/Gambel oak (PPO) and frequent fire mixed conifer (aka mixed conifer dry, or MCD) models. The PPG and PPO models are very similar so the two were evaluated together as “PPF.” The process used to test, adjust and apply the VDDT models to the Kaibab NF is discussed in more detail below, under VDDT Analysis Process of the Kaibab National Forest.

Forest Vegetation Simulator

The FVS is an individual tree, distance-independent, growth and yield model that has been calibrated for specific geographic areas (variants) of the United States (Dixon 2002). FVS can simulate a wide range of silvicultural treatments and was used for certain cases outside of the VDDT model when more resolution was needed. FVS is more sensitive to management actions because it models the fate of individual trees over time, rather than whole states of stand averages. This was needed to better evaluate the probable outcomes of specific treatments such as tree retention guidelines considered in the FEIS alternatives. Results from FVS were used to evaluate how often a treatment would retain or create a multistoried state, whether subsequent treatments were feasible with the same guidelines in place and whether the desired conditions

could be met or retained over time. FVS has better resolution for quantifying the results of specific treatments, which may differ from the stand averages over time. FVS modeling of the tree retention guideline was modeled as a maximum diameter and is documented in Diameter Caps and Forest Restoration: Evaluation of a 16-inch Cut Limit on Achieving Desired Conditions (Triepke et al. 2011).

Spreadsheet-based Models

Various spreadsheet-based models (indices) were used to calculate the relative differences between alternatives for similarity to reference conditions, interspersion of states, understory production as a function of overstory tree density, and correlations of tree canopy cover to tree basal area. These were used for processing the output results from VDDT models.

An important assumption made in the vegetation modeling is that the population and calibration of VDDT using FIA plots and FVS modeling of growth and disturbances generally represents the response of forested PNVTs well enough to compare the estimated effects of EIS alternatives to forested PNVTs in a relative way at the mid-scale.

Goals or desired conditions used to evaluate contributions to sustainability are based on the desired conditions in the draft plan. These desired conditions are a combination of:

- Forest Service Southwestern Region consistent desired conditions, which were developed using an interdisciplinary process and various scientific references (USDA Forest Service 2013).
- Kaibab NF specific desired conditions that supplement the Region 3 consistent desired conditions. The Kaibab also developed desired conditions for non-forested PNVTs not addressed in the regionally consistent process.

VDDT Analysis Process of the Kaibab National Forest

The Kaibab NF began with the models presented here by applying them to the combined ponderosa pine forest/bunchgrass-ponderosa pine/Gambel oak (aka ponderosa pine forest, or PPF) and frequent fire mixed conifer (aka mixed conifer dry, or MCD) models. The forest tested some basic model capabilities and adjusted coefficients to reflect the forest's local history, particularly with fire and regeneration following high severity fire. This model provides a base comparison of the relative progress plan alternatives are predicted to make toward desired conditions; outputs were then supplemented by other information from the spreadsheet-based models discussed previously. VDDT was also used for most of the wood production and potential values calculations as required under the 1982 Planning Rule procedures. Much of the modeling response in VDDT was calibrated using Kaibab NF FIA data inputs and results from FVS runs.

The regional VDDT model (discussed above) has 391 state-transition combinations for both PPF and MCD. Multiple disturbance agents acting simultaneously with differing probabilities make it difficult to assess which disturbances have the greatest effect. In order to make this assessment, the model was deconstructed to better understand the relative influence of outcomes from various disturbances over time, using a simple sensitivity analysis, discussed below.

Probabilistic Transitions for Plant Succession

VDDT models have the ability to model plant succession transitions from any one state to any other state in a specific time period if no other disturbance first intervenes. For example, it might

be expected that as vegetation in a small-sized state grows, that it would transition into a larger state in a predictable fashion. However, there are some complications with the Southwestern region models the Kaibab NF tested to validate this expectation.

In the FVS modeling process used to calibrate the VDDT models (documented in Weisz et al. 2011) several possible outcomes (rather than just one for each state) were identified for most model states. This occurred because the FIA plots that served as the source data for FVS, when modeled individually, grew into a large variety of states within one year. For example, in PPF, medium-sized, closed canopy, single-storied forest (state H in table B 2 and figure B 1), the probabilities that it will transition to a larger state in the following year are about 0.6 percent, while the probability that it will transition to either a multistoried state (L) or a smaller state (F) are about 1.2 percent (the other 98 percent would be expected to remain in the current state, H.)

To account for these diverse outcomes, transitions from natural growth are modeled as the probability of transitions to each of the states. These were entered into the model as probabilistic transitions to accommodate more than one outcome. Their labels are “2_x”, where “2” means the word “to” and “x” means the destination state.

To check the plant succession outcomes, a test was performed where only the 2_x transitions were allowed to operate and all others were not. In one test, the entire PPF model was set to state B (perhaps a common condition after a mega-drought, such as one in the 1500s) and run for 300 years. Another test tried a possible set of historic conditions —50 percent in E and 50 percent in K. The results of these and subsequent tests are presented in table B2.

Add I&D Transitions

Next, we explored the potential outcomes when only the 2_x transitions and endemic insect/disease disturbances were allowed to operate and all others were not, beginning with a young, open forest. Would the model move to the largest, densest states, as expected? Would open large states occur as expected? As above, these were tested to verify the model was “well-behaved,” or in other words produces model results consistent with what would be expected in a natural ecosystem.

Add Fire Transitions

Next we explored the potential outcomes when the 2_x transitions, endemic insect/disease disturbances, and fires burning under various conditions of weather and fuel moisture, with all other disturbances absent, beginning with a young, open forest. Would the model transition to the largest, densest states, as expected with low and moderate fire conditions?

Outcomes

The results of the model runs, presented in the order discussed above, and quantified in table B 2 below, are as follows. These outcomes apply to the scale modeled with VDDT; the mid-scale:

- In 300 years, the model grew 55 percent of the initial small tree (dominated by trees 5 to 10 inches), open state (10 to 30 percent canopy) into larger (dominated by trees greater than 10 inches d.b.h. and canopy greater than 30 percent) (run 1). The model is capable of growing small tree states into the denser and larger states.

- Adding insect and disease disturbances did not result in a detectable change in the outcome for larger state development (run 2). Endemic-level disturbances have a very small effect upon plant succession.
- Adding nonlethal fire (less than 25 percent top canopy kill) slightly increased the attainment of larger open states (run 3). These fires play a role (albeit small) in opening up the forest.
- Beginning with only large, open states (representing reference conditions) and nonlethal fire resulted in slightly more larger state closed conditions than beginning with all state B (run 4).
    - It should be noted that the vegetation characteristics of our large, open states today may not exactly correspond to the vegetation characteristics of the large, open states in reference conditions because there were certainly a wide range of conditions, especially at fine scales; but for the purpose of this analysis, we assumed state K (in figure B 1) captures reference conditions. Quantitative information from inventories and research on the Kaibab NF in ponderosa pine and dry mixed conifer forests uniformly describe the pre-European settlement condition as an open forest dominated by large trees at the mid- or landscape scales (Lang and Stewart1909, Woolsey 1911, Fulé et al. 2002, Huffman et al. 2001). However, the number of stories in the forest is more difficult to describe consistently, and the amount of forest that might have been single- or multi-storied using the definition in this model is hard to predict.
- Increasing fire intensity from low to moderate burning condition transitions dramatically shifted attainment of the larger, denser states to more open states, and also increased attainment of the larger open states from smaller states (run 5). These fires play a role in opening up the forest.
- Increasing the fire probability for moderate burning conditions to 1 in 5 years (run 7) does not make much difference compared to less frequent fire (run 5). Changing initial conditions to all state B slightly reduced the development of larger, open states (run 9).
- Using the fire probability of 1 in 5 years (local average) with low burning conditions (run 8) produced larger states that are comparable to the outcomes in the less frequent, moderate burning conditions of run 5. Changing initial conditions to all state B did not result in changes to development of larger states (run 10).
- Increasing fire intensity to high burning condition transitions with frequent fire nearly prevented attainment of larger states; 9 percent of the landscape attained larger, open states while over 60 percent moved to an uncharacteristic state (state N).

These tests show the VDDT models are well-behaved for plant succession, endemic insect/disease levels. The fire disturbance outcomes are generally well-behaved, although there are some surprises with both moderate and high burning conditions. Adjustments to some fire transitions are discussed below.

Table B 2. Sensitivity/validation analysis of the ponderosa pine forest/bunchgrass (PPG) model

	300 Years with One Iteration												
Run No.		**1**	**2**	**3**		**4**	**5**	**6**	**7**	**8**		**9**	**10**
Test		**2_x (growth) only, with all in State B**	**Run 1 + I&D**	**Run 2 + Nonlethal fire 500-yr (0.2 * .01)**		**Run 3, only w/ "TNC" initial conditions**	**Run 4 except only moderate burn cond.**	**Run 4 except only high burn cond.**	**Run 6 except moderate burn cond.**	**Run 6 except low burn cond.**		**Run 8 except all State B start**	**Run 9 except all moderate burn cond.**
State	**Initial**			**1 in 500 yr fire**	**Initial**	**1 in 500 years fire probability**		**1 in 5 years fire probability**			**Initial**	**1 in 5 years fire probability**	
A		0	0	0		0	7	18	7	2		3	7
B	1.00	1	1	1		0	2	4	3	1	1.00	2	3
C		2	2	2		2	2	2	3	3		3	3
D		1	1	2		1	7	2	8	9		8	8
E		13	13	14	0.50	13	44	6	45	47		43	45
F		5	5	5		5	2	1	3	3		3	3
G		14	14	13		14	4	2	2	3		4	2
H		8	8	7		7	6	1	6	5		7	6
I		11	11	10		8	1	0	1	1		2	1
J		4	3	4		4	4	1	5	3		5	5
K		6	6	6	0.50	7	16	0	14	10		10	14
L		20	20	19		24	5	1	4	10		8	4
M		16	16	16		15	2	0	1	3		3	1
N		0	0	0		0	0	62	0	0		0	0
All	1.00	101	100	99	1.00	100	102	100	102	100	1.00	101	102
m-l open		24	23	26		25	71	9	72	69		66	72
m-l closed		55	55	52		54	14	2	12	19		20	12

Calibrating and Running the Ponderosa Pine Forest (PPF) Model for the Kaibab National Forest

The PPF VDDT model, as delivered by the Southwestern Region, was adjusted to account for Kaibab NF-specific information and some uncertainties related to fire and natural regeneration success.

Adjusting to Kaibab National Forest Specific Information and Uncertainties

Analysis was performed with the VDDT model to evaluate the outcome of thinning prescriptions. Given the need to clearly communicate the results, two indices were developed to facilitate the comparison of model alternative results. One index assigns a value of "1" to the desired condition of "very large tree (dominated by trees greater than 20 inches d.b.h.), open, multistory; with 10 to 30 percent canopy closure" (state K) and a value of "0" to uncharacteristic departed conditions with an uncertain recovery time (state N). In between these bounding values, states were assigned values relative to their time to attain the desired condition assuming successful management, such as timely disturbances that result in progression from closed to open states and from smaller, single-storied to larger, multi-storied states. With successful management, it was assumed that it takes 200 years from seedling establishment to attainment of the desired large open, uneven-aged state.

A second index is much more sensitive to stand density, with open forest conditions receiving higher index values than denser, more closed canopy, conditions. This index is more sensitive to the size of dominant trees.

The first index is a relative indicator of overall similarity to reference conditions while the second index is a relative indicator of the risk of uncharacteristic disturbance, especially stand-replacing fire.

Prescriptions commonly used on the Kaibab NF for restoration treatments include group selection/matrix thinning and free thinning. Diameter cap treatments, as advocated by some, are infrequently used unless restoration objectives can be met with one entry. An initial run of the model using free thinning on states G and L and group selection/matrix thinning states H and M was compared to a run that used only a group selection/matrix thinning prescription (see runs 11, 12 and 13 in table B 3). The group selection with matrix thinning prescription made more progress toward the desired condition when applied to the larger dense states of H, I, L, and M. This prescription was then applied to subsequent runs adding other disturbances. The relative attainment of the desired condition went from 0.546 to 0.637 and 0.648, respectively, for runs 12 and 13. Given this progress toward attainment of the desired condition, these prescriptions were retained for modeling the proposed action.

Run 14 added the potential for high-intensity fire. This predictably reduced progress toward the desired condition, but the effect was relatively small using the regionally provided values for probabilities and outcomes. In the regional models, rather large proportions of the forest transition to regeneration states from large open states. However, local historical data and research shows that most trees within forests in this condition survived numerous fires, regardless of the weather, for centuries. So, for the Kaibab NF implementation of the VDDT models, high-intensity fire was not allowed to occur in large, open states.

It is also worth noting that there is a labeling misnomer in the models. While the prescription names imply fire behavior, they were actually based upon burning conditions (fire weather and fuel moisture). The outcomes in the regional models are based upon results from the Fire and Fuels Extension within the FVS modeling. It is not clear why the outcomes for large open states show so much transition to regeneration (openings) but the experience of local fire experts and research contradicts this outcome. This is why the transitions were prevented from occurring in large open states within the VDDT model used for the Kaibab NF.

Diameter Cap

Issues raised by some members of the public for protecting existing and providing for future old growth call for the retention of presettlement trees. Alternatives C and D have a guideline that would not cut trees that were established prior to 1890, which is generally when fire suppression and intensive livestock grazing began in Northern Arizona. Due to model and data limitations (data and models do not have an age variable) this guideline was modeled as a 16-inch maximum diameter limit or diameter cap. Run 15 explores the outcome of using a diameter cap restriction compared to run 14 which had no diameter cap. The prescription was changed from a group selection/matrix thin, with no diameter cap to a group selection/matrix thin with a 16-inch diameter cap. Desired condition attainment of 0.623 was higher than the initial conditions, but lower than runs 13 and 14. Table B 3 provides a summary of preliminary alternative evaluations used to test the alternative responses within the model under different assumptions.

Table B 3. Preliminary alternative evaluations

Run No.:		Alt. B - 1 (11)	Alt. B - 2 (12)	Alt. B - 3 (13)	Alt. B - 4 (14)		Alt. C - 1 (15)	
Test:		Free Thin H,L; GS-thin I,M; Mod. Burn fire all. Mid-scale initial states.		GS-thin H, I, L, M; Mod. Burn fire all. Mid-scale initial states.	Same as 13 only add stand-replacing fire possible in dense states (1.0).	Same as 14	Same as 14, except substitute d.b.h.-cap Rx for GS/matrix thin	
State	Initial	300 years with 1 simulation	50 years with 10 simulations			250 yrs w/10 sims	50 yrs w/ 10 sims	250 yrs w/10 sims
A	0.09	4	5	5	6	4	5	4
B	0.01	3	3	3	3	3	4	3
C	0.04	3	4	4	4	4	4	3
D	0.08	8	12	7	7	6	12	8
E	0.03	40	35	35	36	42	38	46
F	0.01	3	4	4	4	3	4	3
G	0.08	5	7	7	6	6	6	5
H	0.25	4	5	4	4	3	5	4
I	0.05	0	1	0	0	1	1	1
J	0.07	5	6	7	7	5	5	4
K	0.02	18	13	17	17	19	11	14
L	0.23	3	5	4	4	3	4	3
M	0.02	2	1	2	1	1	1	1
N	0.02	0	0	0	1	0	0	1
All	1.00	98	101	99	100	100	100	100

Note: For additional information on the VDDT and model limitations, see the Vegetation Fuels, and Fire Specialist Report (KNF 2011) appendices.

Stand-replacing Fire

For the initial model runs, The regionally developed models used stand-replacing fire probabilities of 0.01 or 0.02 per acre-year (1 year in 100 or 1 year in 200 - the odds of fire occurring on any cell); however, based upon recent occurrences of stand-replacing fire on the Apache-Sitgreaves, Coconino, and Kaibab NFs and professional opinion about , a stand-replacing fire probability of 0.004 per acre-year (1 year in every 250 years) is being used for VDDT modeling on all three forests. An adjustment was also made to better represent the stand-replacing fire in open states. There is no documented evidence of stand replacing fires occurring on the Kaibab NF at the mid scale (100 to 1,000 acres) in the open pre-settlement forest so stand-replacing fire was only modeled in closed states in PP for the Kaibab.

A comparison of the known outcomes of the 2006 Warm Fire (KNF 2007) was made to evaluate the model outcome probabilities. For purposes of plan and alternative analysis, areas with stand-replacing fire greater than 100 acres are considered undesirable. This is because the time to achieve the desired conditions can be delayed for an indefinite period due to distance from live trees that produce seed without successful artificial regeneration efforts (Haire and McGarigal 2010, Higgins 2008, Savage and, Mast 2005). In the Warm Fire suppression area (wildfire), about 60 percent had almost complete overstory mortality. In the ponderosa pine portion, 75 percent of the area had complete mortality and 25 percent had high mortality (but less than 100 percent – although most trees subsequently died).

The regional model uses a ratio of about 2:1 for states A (characteristic, small openings) to N (uncharacteristic, large openings) for stand-replacing and high Rx burning conditions. For example, in VDDT model state F, a stand-replacing fire would change 39 percent of it to state A and 19 percent of it to state N – about 2:1 for the transitions to states A and N. Based upon the Kaibab NF-specific analysis, the ratio of 1:3 for states A to N was used to represent the portion of stand-replacing fire that goes to either state A or N in the Kaibab model. Table B 4 displays this adjustment. The overall percentage of the beginning (“from”) state does not change; the percentages for the resulting (“to”) states were changed but the overall percentage of change was kept the same. Outcomes to other states were not changed.

Table B 4. Modification of state A:N outcomes for stand-replacing fire and prescribed burn high (regional model Kaibab National Forest-specific adjustment)

↓To \ From→	F	G	H	I	L	M
A	39 → 14	21 → 8	27 → 10	17 → 6	21 → 8	18 → 7
N	19 → 44	11 → 25	13 → 30	8 → 19	8 → 24	9 → 20
Total	58	33	40	25	32	27

The regionally delivered model had a recovery rate from state N (uncharacteristic large openings) to state A (Grass, forb, shrubland; less than 10 percent canopy cover) or state B (Seedling-sapling; less than 10 percent canopy cover) of about 9 percent per year, based upon interpretation of various sources. On the Kaibab, several field visits to high-intensity burn sites have not shown recovery to tree cover without artificial reforestation (planting). Literature on regeneration following wildfire events varies. Savage and Mast (2005) showed regeneration in areas near seed

sources, some other studies showed somewhat prompt recovery, while other areas had virtually no ponderosa pine regeneration.

Aspen, oak, brush species and/or grasses have occupied all Kaibab NF sites visited with past high-intensity burns. Following the 1996 Bridger Fire on the North Kaibab District, the mid-scale assessment mapped oak brush as tree cover and found 10 to 25 percent tree cover. The overall canopy cover is probably in that range, but very little is ponderosa pine, and almost none was ponderosa pine regeneration. The highest known natural regeneration frequency following a large stand-replacing fire event on the Kaibab NF is after a fire in North Kaibab District's Saddle Mountain Wilderness documented by Haire (2010). In this study, there was a definite line of ponderosa pine re-occupancy from the forested edge, with a few interior seedlings that are likely from individual surviving pre-fire trees. This is consistent with regeneration patterns observed by Savage and Mast (2005) with nearby seed sources. However, even at Saddle Mountain the regeneration rates were well below 9 percent per year. Verbal communication with Haire about the Saddle Mountain and La Mesa Fires indicates that the best case (observed on La Mesa in New Mexico, but not on Saddle Mountain) would be about 9 percent year.

The regional model moves 9 percent per year from state N to K with natural regeneration. The Kaibab adjustment uses both 0 percent and 5 percent regeneration of ponderosa pine per year to evaluate alternatives. The 5 percent per year is roughly what the Kaibab NF can currently accomplish with artificial reforestation in areas suitable for timber production following crown fires, and is a modeled objective for the proposed action.

Second Round Analysis

VDDT databases, "kaibab-preside-vddt-2010-11-08.mdb" (for PP [ponderosa pine]) and "mcd-preside-vddt-2010-12-08.mdb" (for MCD [mixed conifer, dry]) contain the model runs for each EIS alternative and alternative portion (timber suitable, other and unsuitable) when applicable.[3]

Both categories of ponderosa pine type, PPG and PPO, were run together for the DEIS analysis using the PPG model developed by the region, as adjusted. It is referred to here as the ponderosa pine forest (PPF) model.

Adjustments to the regionally developed models are documented above. The following assumptions and parameters were applied to the model:

- Stand-replacing fire frequency was modeled at 1 per 250 years.
- Disturbances with a model frequency of 0 – 0.0001 are not presented, as they are negligible to model results; 2_x disturbances are as developed regionally; no changes were made for local conditions.
- Natural regeneration was turned off. This only affects transitions from state N to A.

[3] "Timber suitable" areas are those where a regular entry to produce timber is assumed. Although not explicit in the model, it is also assumed that an effort would be made to regulate stands so that they are uneven-aged and have a generally balanced representation of age classes. "Other" areas are places where trees may be harvested but there is no objective to regularly produce forest products. They are still intended to be uneven-aged but may have large gaps in age classes. "Unsuitable" areas are those where no mechanical treatment is modeled, because the areas are reserved lands (such as wilderness or proposed wilderness), have other management requirements imposed in the plan alternative that prohibits tree harvest, or could have irretrievable resource damage if mechanical treatments were applied.

- Artificial reforestation at current rates (around 5 percent per year) is adequate to keep up with creation of state N, should planting occur. If no artificial reforestation, the recovery of N to A is likely to be much less than this, and may be effectively zero when regeneration to characteristic desired species abundance is considered.
- Runs with no regeneration (natural or planting) were done to evaluate the number of acres likely to need planting over time – a cost factor in alternative evaluation and discussion.
- Outputs were captured every five years for 250 years, with 10 simulations each time into files that could be imported into spreadsheets for further analysis. A thousand cells were used. As discussed above, "[t]o simulate transitions from one state to another, VDDT uses a fixed number of cells with each cell assigned to a succession state and age. For each simulation year VDDT cycles through the cells, generates a random number, and determines whether each cell gets a year older in the same state, moves to a new successional state, or has a disturbance applied to it that would also move the cell to a new state."
- The output files were imported into and stored in spreadsheets as pivot tables for each alternative, with tabs for alternative portions and an activity table used for an "interspersion calculation." Interspersion refers to the juxtaposition of vegetation states; high interspersion means there is high diversity of vegetation states in a small area. This is an important measure used to evaluate fine-scale desired condition attainment.) The naming convention for these spreadsheets is [PP:MCD]_Summary_[A:B:C:D].xlsx.
- The alternative portions tabs were transferred to tabs in two spreadsheets; either pp-kaibab-alternatives-2010-12-16.xlsx (for PP PNVTs) or dmc-kaibab-alternatives-2010-12-16.xlsx (for MCD).

Other key model run settings and inputs to the VDDT models are displayed in table B 5. Under the heading "Alternative and analysis portion" are sub-headings that identify alternative, alternative portion, and some information detail about the alternative portion. For example, "As-fvs" refers to alternative A, timber suitable portion, and that some local FVS modeling was used to refine the regional model transitions. "Bo-w-ft" refers to alternative B, "other portion" and that free thinning was applied to the initial model prescription. Other details relevant to table B 5 are:

- Alternatives A through D are divided into portions (timber suitable, other and unsuitable) and modeled separately.
- Names of portions correspond to the subdirectories where model results are written, and are somewhat descriptive of the portion. "FVS" indicates the Kaibab carried out some FVS modeling to help calibrate model outcomes over several decades for the prescription applied (d.b.h. cap). "W_ft" indicates a free-thinning was added to the initial prescription of "GS-matrix thin only" after some time to address some increasing thinning treatment needs.
- The "TSD on?" (time since disturbance) is a way to time treatments in VDDT and is used here for portions where a "restore with thinning, then use fire only" management is in place. The model may only mechanically treat a cell one time. For MCD, a problem with the TSD switch wasn't fixable in the time available, so area limits were applied over time to transition groups to simulate the TSD effect.

- Several multipliers are qualified with area or time-area limits. For example, “550+” means at least 550 acres per year are treated. “(1020: 0-1k; 21+ 1.5k-2k)” means 0 to 1,000 acres per year in years 1 through 20 and 1,500 to 2,000 acres per year thereafter.

Table B 5. VDDT model settings for areas and multipliers by alternative portions

VDDT Model settings for the DEIS analysis

Data base	Area &/or Multiplier	Alternative and analysis portion										
		As-fvs	Ao	Au	Bs-w-ft	Bo-w-ft	Bu	Cs-fvs	Co-fvs	Cu	Do-fvs	Du
ppf.mdb	Acres	325,433	144,216	77,431	301,676	167,163	78,241	277,275	186,111	83,694	463,386	83,694
	TSD On?	Yes	No		No	No	No	No	Yes	No	Yes	No
	B Free thin… (Min-Max)	0.162 (550+)	0		2.7 (0-1k; 1.5k-2k)	2.7 (0-1.5k; 2k-3k)	0					
	D Thin under 16-inch… (Min-Max)	0.162 (550+)	0					2.639 (6k - 6k)	2.415 (4k - 4k)	0	2.425 (10k - 10k)	0
	E GroupSelect w… (Min-Max)	0.318 (993+)	0		5.366 (1-20: 13k - 13k; 21+: 10k -	5.366 (1-20: 3k - 5k; 21+:	0					
	I Plant Seedlings	5.002	0		5		0	5		0	5	0
	J RX FIRE ONLY L… (Min-Max)	0.924			2.5							
	K RX FIRE ONLY M… (Min-Max)	2.95			7.5							
	Stand-Replacing Fire	0.4										
	Insect/Disease	NC										
	2_x	NC										
	Natural Regeneration	0										
dmc.mdb	Acres	37,507	351	89,861	36,410	1,248	90,061	32,237	5,201	90,281	37,438	90,281
	TSD On?	No						No	Yes	No	Yes	No
	B Free thin… (Min-Max)	0			1 (400-400)	1	0					
	D Thin under 16-inch… (Min-Max)	0						7.76 (1-20:1.8k-3.2k) 21-60: 3.88 (.9k - 1.6k); 61+: 1	7.76 (1-20:0.3k-0.5k) 21+: 0	0	4.95 (1-20:1.55k - 2.15k) 21+: 0	0
	E GroupSelect w… (Min-Max)	0.542	0		7 (1-20: 1400-2800; 21+: 1400+)	7	0					
	I Plant Seedlings	5	0		5		0	5	5 (210-310);	0	5 (0 - 1.9k);	0
	J RX FIRE ONLY L… (Min-Max)	1			5		2.5	5		2.5	5	2.5
	K RX FIRE ONLY M… (Min-Max)	3			5							
	Stand-Replacing Fire	0.4										
	Insect/Disease	NC										
	2_x	NC										
	Natural Regeneration	0										

The following sections describe some design features of the alternatives evaluated and the settings and inputs to VDDT models for each of them. Refer back to table B 5 for each description. Tables B 6 through B 13 present some parameters used for running the models on portions of the alternative. Where "once" is used, a treatment may not reoccur during the model run on a cell after it has occurred once. This is used to prevent future mechanical treatments in areas where the intent is restore the forest (consistent with any limits in the alternative design direction) and then use natural disturbances only (particularly fire) thereafter to manage forest structure and composition.

No Action

The current forest plan, as implemented in recent projects, is the modeled "no action" alternative. Current (last 5 years) rates and typical prescriptions (or surrogates) are used.

Ponderosa Pine (PPF)

The Kaibab NF has several thousand acres of historic grasslands invaded by trees, primarily ponderosa pine, due to fire absence. These grassland PNVTs are identified as timber suitable in the current forest plan and may receive treatments in project areas to reduce trees to historic densities (less than 10 percent canopy cover) and patterns. Although these may be reclassified as grasslands with a site-specific plan amendment, they are retained in timber suitable for model purposes in this alternative. Timber suitable areas are those identified in the current plan. "Other" lands are unlikely to receive mechanical treatments in this alternative, so they are treated with fire only. "Unsuitable" in the spreadsheets means reserved lands or those where irreversible resource damage could occur with mechanical treatments also receive fire-only treatments.

For timber suitable areas:

- Objectives include some free thinning and d.b.h. cap (where objectives can be met in PP) and group selection with matrix thinning, with overall mechanical treatments totaling around 2,100 acres per year (last 5 years average), reforestation at 5 percent per year, and low to moderate managed fire on about a 20-year return interval.

For "other" and "unsuitable" areas:

- Set no mechanical treatments or planting objectives. Fire return interval is about 20 years, currently.

Table B 6. Model parameters for alternative A – PPF runs

Portion	Timber Suitable	Other	Unsuitable
Area (Acres)	325,433	144,216	77,431
Mechanical treatment	Yes	No	No
Reforestation	Yes	No	No

Frequent Fire Mixed Conifer (MCD)

The current forest plan includes many conservation measures specified in the 1995Mexican Spotted Owl Recovery Plan. Implementation of the current forest plan's direction in Mexican spotted owl habitat has effectively placed significant limits on the ability of the Forest Service to

restore this system, either with thinning or fire, partly because of high basal area retention requirements, low diameter caps and the associated costs of economically thinning or safely under-burning the forest. Current accomplishments (based on recent history under the current plan) are applied to timber suitable areas.

For timber suitable areas:

- Objectives include group selection – matrix thin on 150 acres per year, reforestation at 5 percent per year. Low to moderate burning condition fire are set to return intervals of 100 years and 33 years, respectively, for a combined return interval of 25 years.

For "other" and "unsuitable" areas:

- No mechanical treatments or plantings are scheduled. Managed fire is the same as the timber suitable area.

Table B 7. Model parameters for alternative A - MCD runs

Portion	Timber Suitable	Other	Unsuitable
Area (Acres)	37,507	351	89,861
Mechanical treatment	Yes	No	No
Reforestation	Yes	No	No

All Action Alternatives (Alternatives B, C and D)

Consistent with recommendations from the Kaibab Forest Health Focus (KNF 2009a) and concurrence from the Kaibab leadership team, treatments were initially focused on areas with the "biggest bang for the effort" to restore a fire-tolerant state. The filters applied are, in order:

- States where risk of uncharacteristic fire is high (closed-canopy states – F, G, H, I, L, and M);
- Places where there is the greatest potential of loss in attaining the desired condition of state K (closed-canopy states containing many large, old trees that would take over a century to replace and that could attain state K relatively quickly given proper management - H, I, L, and M); and,
- States likely to be treated without a high net cost; states H, I, L, M. Conversely, other states require relatively higher effort or expense for little gain, so thinning in these other states is not initially, planned.

Within the states treated, the large majority of trees that would be thinned are smaller than the average trees that dominate the state in all alternatives.

Overall, an attempt was made to have fire occur on all lands on a 10-year return interval, with a 1 to 3 ratio of low to moderate conditions to reflect recent history. Adjustments were made in the unsuitable areas of MCD to reduce the incidence of uncharacteristic fire.

Proposed Action (Alternative B)

This alternative is based on the proposed action description:

- Adopts the upper range of thinning and restoration area objectives identified in the Kaibab Forest Health Focus for both PPF and MCD PNVTs.
- Uses group selection with matrix thinning and free thinning for mechanical treatments.
- Uses the tree class retention guidelines for identifying older trees while maintaining treatment implementation economy.

Ponderosa Pine (PPF)

For timber suitable areas:

- Objectives for thinning and Group Selection-matrix thin are 14,500 to 15,000 acres per year for 20 years and planting 5 percent per year of uncharacteristic fire areas (state N).
- Prescribed fire and managed wildfire use multipliers of 2.5 for low burning conditions and 7.5 for moderate burning conditions; resulting in a combined multiplier of 10, and therefore a 10-year fire return interval.

For other areas:

- Objectives for thinning and group selection-matrix thin are 0 to 1,500 acres per year for 20 years and planting 5 percent per year of uncharacteristic fire areas (state N).
- Prescribed fire and managed wildfire use multipliers of 2.5 and 7.5 for low and moderate burning conditions, respectively.

For unsuitable areas:

- No mechanical or planting objectives are identified.
- Prescribed fire and managed wildfire use multipliers of 2.5 and 7.5 for low and moderate burning conditions, respectively.

Table B 8. Model parameters for alternative B – PPF runs

Portion	Timber Suitable	Other	Unsuitable
Area (Acres)	301,676	167,163	78,241
Mechanical treatment	Yes	Once	No
Reforestation	Yes	Once	No

Frequent Fire Mixed Conifer (MCD)

Agreement was reached in the Kaibab Forest Health Focus (KNF 2009a) that at least 14,000 acres annually may be treated mechanically in dry mixed conifer forest, but the specific types of treatment or prescriptions were not identified. A group selection-matrix thin and free thinning prescriptions in timber suitable was applied in the proposed action (alternative B) to address the minimum need in a decade, assuming an equivalent need will be identified in the second decade and future maintenance needs will also occur in a regulated forest.

For timber suitable acres:

- Objectives for thinning and group selection-matrix thin are 1,400 to 2,800 acres per year for 20 years and planting 5 percent per year of state N.
- Prescribed fire and managed wildfire are assumed at 20-year return intervals for both low and moderate burning conditions, respectively, for a combined 10-year return interval.

For other areas:

- Only small mechanical treatment or planting objectives are identified due to the limited area (1,200 acres.)

For unsuitable acres:

- There are no objectives for mechanical or planting treatments. Overall prescribed fire frequency was lowered to account for limitations on burning in highly vulnerable North Canyon Creek (stand-replacing fire risk) and the associated Apache trout habitat.

Table B 9. Model parameters for alternative B – MCD runs

Portion	Timber Suitable	Other	Unsuitable
Area (Acres)	36,410	1,248	90,061
Mechanical treatment	Yes	Yes	No
Reforestation	Yes	Yes	No

Alternative C

This alternative modifies the proposed action with these major changes:

- Reclassifies most timber suitable areas on the North Kaibab Ranger District to "other," with a restore and then use fire only prescription.
- Adds several wilderness recommendations that reserve areas from both timber suitable and "other" areas (to "unsuitable").
- Uses a d.b.h. cap instead of a group selection-matrix thin prescription.

Ponderosa Pine (PPF)

For timber suitable areas:

- Objective for thinning is lowered to 6,000 acres per year (60 percent of the lower end of the Kaibab Forest Health Focus for PP).
- Planting and prescribed fire objective multipliers are unchanged from alternative B.

For other areas:

- Objective for thinning is 4,000 acres per year (40 percent of the lower end of the Kaibab Forest Health Focus for PP).
- A d.b.h. cap is used (once) on these reduced acres.
- Planting may occur, but never after a thinning has occurred (190 acres per year).

For unsuitable areas:

- Objectives are the same as alternative B.

Table B 10. Model parameters for alternative C – PPF runs

Portion	Timber Suitable	Other	Unsuitable
Area (acres)	277,275	186,111	83,694
Mechanical treatment	Yes	Once	No
Reforestation	Yes	Once or No	No

Frequent Fire Mixed Conifer (MCD)

For timber suitable areas:

- Timber suitable area is about 32,000 acres.
- Objective for thinning is 1,800 to 3,200 acres per year for 20 years.

For other areas:

- Area is about 5,200 acres, primarily on the North Kaibab Ranger District in the North Kaibab Wildlife Habitat Complex.
- Objective for thinning is 300 to 500 acres per year for 20 years, then ceases, going to fire maintenance.
- No objective for planting is modeled due to the small size of the area and the unlikelihood of a stand-replacing fire in the 20 years before management becomes fire maintenance.

For "unsuitable" areas:

- Area is about 93,000 acres.
- Turn off mechanical treatments and planting.
- Prescribed fire objectives (multipliers) are the same as alternative B.

Table B 11. Model parameters for alternative C – MCD runs

Portion	Timber Suitable	Other	Unsuitable
Area (acres)	32,237	5,201	90,281
Mechanical treatment	Yes	No	No
Reforestation	Yes	No	No

Alternative D

This alternative is based on the alternative C description with these major changes:

- Reclassifies remaining timber suitable areas on the Kaibab NF to "other," with a d.b.h. cap (in effect) and then applies a fire only prescription.
- Adds several wilderness recommendations that reserves area from both timber suitable and "other" areas (to "unsuitable")
- Thinning objectives for timber suitable and other areas in alternative C are combined into one objective in other areas for this alternative.

Ponderosa Pine (PPF)

For "other" areas:

- Objective for thinning is 10,000 acres per year; planting and fire objectives (multipliers) are the same as alternative C.

Table B 12. Model parameters for alternative D – PPF runs

Portion	Timber Suitable	Other	Unsuitable
Area (acres)	0	463,386	83,694
Mechanical treatment?	NA	Once	No
Reforestation?	NA	Once or No	No

Frequent Fire Mixed Conifer (MCD)

For "other" areas:

- Objective for thinning is 10,000 acres per year for 20 years, then ceases, going to fire maintenance.
- Planting may occur but not after a thinning and ceases when management shifts to fire maintenance.

For "unsuitable" areas:

- No mechanical treatments or plantings are planned. Managed fire is the same as alternative C.

Table B 13. Model parameters for alternative D – MCD runs

Portion	Timber Suitable	Other	Unsuitable
Area (acres)	0	37,438	90,281
Mechanical treatment	NA	Once	No
Reforestation	NA	Once or No	No

Wildlife Habitat Analysis (Based on VDDT)

The VDDT model analysis process is described in detail above. The existing vegetation conditions were stratified into different states, and then the model was used to predict how the vegetation states would change over time under each of the alternatives. Because the VDDT model uses mid-scale data (1:100,000 map scale), percent canopy cover averages the openings and tree cover over the entire mid-scale area. This means that at the fine scale, some areas may have lower actual canopy closure and other areas may have higher actual canopy closure than what is shown in the state description. This is true for mid-scale data in general because the variables are averaged over the areas of 100 to 1,000 acres.

The forest first defined which vegetative states would provide habitat for certain species. The habitat types were selected based on the associated PNVT as identified in the species diversity report. Table B 14 shows the species and states that were associated to each species habitat. Every species is not necessarily associated with every vegetation state (e.g., Kaibab tree squirrel uses a broader range of vegetation states than does the Mexican spotted owl).

The current amount of habitat was first determined by selecting vegetation type (i.e., ponderosa pine) and then the tab for "initial conditions." The percentage for each existing state was then converted into acres. Next, the predicted amount of the states in 15 years was compared to the initial conditions to determine how the vegetation would change under each alternative. This was done for each vegetation type by selecting for each alternative the "forestwide totals" tab and then using the average percent of acres in each state for each decade to determine percentage amount. For example, decade 1.5 results in a percentage for year 15. The percentages were then converted to acreages

For some species, there was a need to include further assumptions:

The Mexican spotted owl only uses ponderosa pine/Gambel oak habitat on the Williams Ranger District within the pine type. However, the VDDT model lumps this habitat type in with all ponderosa pine. Based on the GIS layer for the Williams Ranger District there is approximately 49,440 acres of the ponderosa pine that is considered to be ponderosa pine/oak currently on the district. Therefore to estimate the amount of change in this habitat, the selected states in ponderosa pine were multiply by nine percent, which is the percentage of pine-oak on the Williams RD of ponderosa pine cover type on the Forest.

The Kaibab tree squirrel is only found in ponderosa pine on the North Kaibab Ranger District. Based on the Kaibab National Forest Ecological Sustainability Report (Version 1.01, December 19, 2008), the district has approximately 28 percent of the ponderosa pine cover type on the forest. Therefore, the states selected for the Kaibab tree squirrel were multiplied by 28 percent to estimate the amount of habitat affected on the district.

The Kaibab least chipmunk and Kaibab northern pocket gopher both use mesic mixed conifer and spruce-fir habitat on the North Kaibab Ranger District. While there is a small amount of mesic mixed conifer found on the Williams Ranger District, almost all of the vegetation type is found on the North Kaibab Ranger District. Since there is only a limited amount of habitat on the Williams Ranger District, the total acres of mesic mixed conifer was used to determine the amount of habitat for these species.

Table B 14. Species analysis for ponderosa pine and mixed conifer by species, their habitat needs and their associated VDDT model states

Species	States	Comments
Mexican spotted owl	K, L, M	Is associated with large trees in multistory stands and >40 percent canopy closure. Uses ponderosa pine/Gambel oak and mixed conifer stands.
Goshawk	J, K, L, M	Is associated with large trees in multistory stands both open and closed. Shows nesting, roosting, and post-fledgling family habitat acres. Uses ponderosa pine and frequent fire mixed conifer stands.
Bald eagle	D, E, H, I, J, K, L, M	Is associated with large ponderosa pine trees. Will use both open and closed stands.
Allen lappet-browed bat	D, E, H, I, J, K, L, M	Is associated with large trees with loose bark. Will use both open and closed stands. Is found in ponderosa pine and frequent fire mixed conifer (MCD).
Merriam's shrew	C, D, E, J, K	Is associated with open conifer stands. Is found in ponderosa pine and frequent fire mixed conifer (MCD)
Kaibab tree squirrel	E, H, I, J, K, L, M Optimum habitat J, K, L, M	The squirrel will use a variety of stands for foraging within ponderosa pine stands. Optimum habitat (nesting habitats) is more restricted to large trees with interlocking crowns within the groups.
Kaibab least chipmunk	C, D, E, J, K	Is associated with openings within mesic mixed conifer stands.
Kaibab northern pocket gopher	C, D, E, J, K	Is associated with openings within mesic mixed conifer stands.

Table B 15 compares current existing conditions by vegetation "state" (used in the VDDT model runs) for mixed conifer, with conditions expected to occur under implementation of each of the alternatives. Table B 16 displays specific species associated with mixed conifer habitat and how their existing habitat (as defined by the vegetative states in table B 14) would likely change by implementing the proposed alternatives. It combines the relevant vegetation states from table B 15 for each species into one value to compare existing to future habitat for each species by alternative.

Table B 15. VDDT modeling used for species dependent on mixed conifer habitat, current condition and each alternative after 15 years

Mixed Conifer - Total Acres on PNVT= 12,7719						(Acreage Includes Dry and Mesic MC:10,700 +20,719)				
States	Current	Current Acres	Alt. A	Alt. A Acres	Alt. B	Alt. B Acres	Alt. C	Alt. C Acres	Alt. D	Alt. D Acres
A	6%	7,804	0%	0	1%	1,660	1%	1,277	1%	1,788
B	1%	1,277	1%	1,277	1%	1,660	1%	1,277	2%	2,554
C	7%	8,429	0%	0	1%	1,660	1%	1,277	1%	1,788
D	1%	1,405	5%	6,386	8%	10,218	6%	7,663	7%	8,940
E	5%	6,322	5%	6,386	8%	10,218	16%	20,435	15%	19,158
F	0.21%	268	17%	21,712	16%	20,435	17%	21,712	17%	21,712
G	8%	10,141	8%	10,218	6%	7,663	7%	8,940	7%	8,940
H	32%	40,806	18%	22,989	12%	15,326	13%	16,603	12%	15,326
I	0.14%	179	4%	5,109	2%	2,682	3%	3,193	2%	2,554
J	0.50%	639	3%	3,832	6%	7,663	3%	3,193	4%	5,109
K	0.50%	639	4%	5,109	11%	14,049	5%	6,386	5%	6,386
L	17%	21,712	15%	19,158	10%	12,772	11%	14,049	10%	12,772
M	10%	12,772	9%	11,495	6%	7,663	6%	7,663	5%	6,386
N	12%	15,326	11%	14,049	11%	14,049	11%	14,049	11%	14,305
Total	100%	127,719	100%	127,719	100%	127,719	100%	127,719	100%	127,719

Table B 16. Total habitat for species dependent on mixed conifer for each alternative

Species	States	Current	Alt. A	Alt. B	Alt. C	Alt. D
Goshawk habitat	J, K, L, M	35,761	39,593	42,147	31,291	30,653
MSO habitat	(K, L, M)	35,123	35,761	34,484	28,098	25,544
Allen LEB	D, E, H, I, J, K, L, M	84,473	80,463	80,591	79,186	76,631
Merriam's shrew	C, D, E, J, K	17,434	21,712	43,808	38,954	41,381

Table B-17 compares current existing conditions by vegetation "state" (used in the VDDT model runs) for mesic mixed conifer, with conditions expected to occur under implementation of each of the alternatives. Table B 18 displays specific species associated with mesic mixed conifer habitat and how their existing habitat (as defined by the vegetative states in Table B-14) would likely change by implementing the proposed alternatives. It combines the relevant vegetation states from Table B-17 for each species into one value to compare existing to future habitat for each species by alternative. Further assumptions as noted above apply to the Kaibab least chipmunk and Kaibab northern pocket gopher.

Table B 17. VDDT modeling used for species dependent on mesic mixed conifer habitat, current condition, and each alternative after 15 years

Mesic Mixed conifer - total acres on Forest of PNVT = 20,719										
States	Current	Current Acres	Alt. A	Alt. A Acres	Alt. B	Alt. B Acres	Alt. C	Alt. C Acres	Alt. D	Alt. D Acres
A	6%	6,538	0%	0	1%	1,391	1%	1,070	1%	1,498
B	1%	1,070	1%	1,070	1%	1,391	1%	1,070	2%	2,140
C	7%	7,062	0%	0	1%	1,391	1%	1,070	1%	1,498
D	1%	1,177	5%	5,350	8%	8,560	6%	6,420	7%	7,490
E	5%	5,297	5%	5,350	8%	8,560	16%	17,120	15%	16,050
F	0.21%	225	17%	18,190	16%	17,120	17%	18,190	17%	18,190
G	8%	8,496	8%	8,560	6%	6,420	7%	7,490	7%	7,490
H	32%	34,187	18%	19,260	12%	12,840	13%	13,910	12%	12,840
I	0.14%	150	4%	4,280	2%	2,247	3%	2,675	2%	2,140
J	0.50%	535	3%	3,210	6%	6,420	3%	2,675	4%	4,280
K	0.50%	535	4%	4,280	11%	11,770	5%	5,350	5%	5,350
L	17%	18,190	15%	16,050	10%	10,700	11%	11,770	10%	10,700
M	10%	10,700	9%	9,630	6%	6,420	6%	6,420	5%	5,350
N	12%	12,840	11%	11,770	11%	11,770	11%	11,770	11%	11,984
Total	100	107,000	100	107,000	100	107,000	100	107,000	100	107,000

Table B 18. Total habitat for species dependent on mesic mixed conifer for each alternative

Species	States	Current	Alt. A	Alt. B	Alt. C	Alt. D
MSO habitat	(K, L, M)	5,698	5,801	5,594	4,558	4,144
Kaibab least chipmunk, K. N. Pocket gopher	(C, D, E, J, K)	2,828	3,522	7,107	6,319	6,713

Table B-19 compares current existing conditions by vegetation “state” (used in the VDDT model runs) for ponderosa pine, with conditions expected to occur under implementation of each of the alternatives. Table B-20 displays specific species associated with ponderosa pine habitat and how their existing habitat (as defined by the vegetative states in Table B-14) would likely change by implementing the proposed alternatives. It combines the relevant vegetation states from Table B-19 for each species into one value, to compare existing to future habitat by alternative. Further assumptions as noted above apply to the Mexican spotted owl and Kaibab squirrel.

Table B 19. VDDT modeling used for species-dependent on ponderosa pine habitat, current condition, and each alternative after 15 years

Ponderosa Pine - VDDT - total acres on forest = 547,080										
States	Current	Current Acres	Alt. A	Alt. A Acres	Alt. B	Alt. B Acres	Alt. C	Alt. C Acres	Alt. D	Alt. D Acres
A	9%	49,237	4%	21,883	5%	27,354	5%	27,354	5%	27,354
B	1%	4,924	3%	16,412	3%	16,412	3%	16,412	3%	16,412
C	4%	21,883	3%	16,412	4%	21,883	3%	16,412	3%	16,412
D	8%	43,766	10%	54,708	8%	43,766	12%	65,650	14%	76,591
E	3%	16,412	12%	65,650	11%	60,179	14%	76,591	18%	98,474
F	1%	5,4071	4%	21,883	4%	21,883	4%	21,883	4%	21,883
G	8%	43,766	8%	43,766	8%	43,766	7%	38,296	7%	38,296
H	25%	136,770	15%	82,062	10%	54,708	13%	71,120	10%	54,708
I	5%	27,901	3%	16,412	2%	10,942	2%	10,942	2%	10,942
J	7%	38,296	9%	49,237	13%	71,120	10%	54,708	8%	43,766
K	2%	10,942	5%	27,354	14%	76,594	8%	43,766	5%	27,354
L	22%	120,358	18%	98,474	13%	71,120	14%	76,591	17%	93,004
M	3%	16,412	4%	21,883	3%	16,412	3%	16,412	2%	10,942
N	2%	10,942	2%	10,942	2%	10,942	2%	10,942	2%	10,942
Total	100%	547,080	100%	547,080	100%	547,080	100%	547,080	100%	547,080

Table B 20. Total habitat for species-dependent on ponderosa pine habitat for each alternative

Species	States	Current	Alt. A	Alt. B	Alt. C	Alt. D
Goshawk habitat	J, K, L, M	186,007	196,949	235,244	191,478	175,066
Mexican spotted owl habitat	K, L, M (14% of PP meets PP/oak)	13,294	13,294	14,771	12,399	11,817
Allen lappet-browed bat and bald eagle	D, E, H, I, J, K, L, M	410,857	415,781	404,839	415,781	415,781
Merriam's shrew	C, D, E, J, K	131,299	213,361	273,540	257,128	2562,598
Kaibab squirrel	E, H, I, J, K, L, M (28% of PP on NKRD)	102,785	101,100	101,100	98,037	94,973
Kaibab squirrel (optimal)	J, K, L, M	52,082	55,146	65,868	53,614	49,018

Watersheds, Soils, and Waters

Analyses used to determine the environmental consequences of implementing the plan alternatives on the soil and watershed resources were based on information in the Kaibab National Forest's Terrestrial Ecosystem Survey (USDA Forest Service 1991), the Kaibab National Forest Comprehensive Evaluation Report (KNF 2009b), the Kaibab National Forest Supplement to the Comprehensive Evaluation Report (KNF 2010), information obtained from other Kaibab NF resource specialists, other agency reports, available literature, and input from Kaibab NF collaborators and cooperators. Geospatial analysis was used to quantitatively and qualitatively assess soils and subbasin, watershed, and subwatershed conditions. Analyses were performed under the framework provided by the four primary needs for change identified in the plan. The Soils, Watersheds, and Waters Specialist Report contains a more detailed description of the analysis used for evaluating effects to soils, watersheds, and water resources (KNF 2013a)

Soils information from the terrestrial ecosystem survey (TES; available at http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5138598.pdf) and outputs from the Vegetative Dynamics Development Tool (VDDT) were used to determine the effects treatments under different plan alternatives would have on soil conditions. VDDT modeling results for each potential natural vegetation type (PNVT) were based on the range of acres of proposed treatment for each PNVT by alternative. The TES was used to evaluate and adjust land uses to the limitations and potentials of natural resources and the environment. Interpretations based upon TES incorporate: (1) soil physical and chemical properties; (2) climatic considerations; (3) topographic position and slope; (4) vegetation and anthropogenic influences as well as animal impacts; (5) productive and successional potentials; and (6) geologic influences.

Effects to water quality were assessed qualitatively by alternative by comparing projected changes to current areas of water quality impairment and by comparing predicted indirect effects by major land-disturbing activities (e.g., forest thinning, animal grazing, roads, mining, and burning) to desired conditions set by Arizona authority under the Clean Water Act. Effects to water yield are discussed qualitatively, based on comparison of current activities to projected effects of implementing alternatives. Effects to groundwater availability are discussed qualitatively using regional studies and Forest Service policies to generally predict effects to the forests. Other watershed evaluation criteria discussed include the condition of streams and habitat, aquatic ecosystems, riparian vegetation, roads, soils, fire regime and effect, forest cover, rangelands and open areas, terrestrial nonnative invasive species, and forest health related to insects and disease.

Nonnative Invasive Plants

For the purposes of this analysis, current known populations of noxious and invasive species were reviewed and incorporated as the affected environment along with discussion of how these species respond to management activities. How these populations could be affected by management activities and the potential for new infestations were analyzed for each alternative. Invasive seed vectors that provide the ability for seed to be moved from one area to another, and the level of disturbance generated by each alternative, were the primary evaluation criteria. The scale of potential activities and the impact to invasive species were also considered.

Air Quality

Comparison of air quality impacts was analyzed using outputs from the Vegetation Dynamics Development Tool (VDDT). See the "Vegetation, Fuels and Fire" methodology section above for a description of VDDT. For a full discussion of the development, calibrations, and assumptions used in the VDDT models for the Kaibab NF, as well as all outputs from the model, refer to the Vegetation, Fire and Fuels Specialist Report (KNF 2013b).

VDDT models for ponderosa pine and frequent fire mixed conifer were developed by the Forest Service at the regional level to be used specifically to compare alternatives for forest land management plans in Region 3. For ponderosa pine and frequent fire (dry) mixed conifer, there are 14 states that are each defined by the variables of predominant diameter class, canopy cover, single storied versus multistoried, and potential for natural regeneration. States A, B, C, D, E, J, K, and N are "open states" in that canopy cover is 30 percent or less. The others 6 states are classed as "closed" with greater than 30 percent canopy cover.

This analysis used the running averages of acres of ponderosa pine and frequent fire (dry) mixed conifer treated by wildland fire from the objectives for each alternative as a fixed number per year to make broad comparisons among alternatives. In reality, the climatological, social, and logistical limits cause wide fluctuations in the number of acres treated each year.

Fuel model, fuel loading, and fuel moisture are highly variable over time and space. For making broad comparisons between the alternatives of "least," "more," and "most" air quality impacts, these inputs are greatly simplified. For site-specific projects, fuel loadings are more precisely estimated, and emissions are predicted in accordance with Arizona statutes and Arizona Department of Environmental Quality regulations.

The analysis did not attempt to predict the actual total emissions that would be produced under each alternative. Rather, it aims to present a rationale for which alternatives are likely to produce the "least," "more," and "most" emissions. It assumes that, over time, there is some degree of correlation between total emission production, and total air quality impacts; while impacts are measured as the concentration of emissions, not the total amount of emissions, over the course of 10, 50 or 250 years, the alternative that produces the most *emissions* is likely to produce the most air quality *impacts*. Though meteorological conditions vary immensely by time of day, and from one weather system to the next, over the course of years these varying conditions should have an averaging effect over time, allowing a correlation between total emissions and total impacts.

Recreation

Probable management activities related to alternatives A, B, C and D were used to evaluate or predict long- and/or short-term effects on recreation settings. These activities were evaluated in relation to their effects on recreation settings, opportunities, and/or experiences. The analysis used the running averages of acres of ponderosa pine and frequent fire (dry) mixed conifer treated by wildland fire, acres mechanically treated (thinned) and acres identified for potential wilderness areas from the objectives for each alternative as fixed numbers per year in order to make broad comparisons between alternatives.

Scenery

The key indicator used in the analysis to determine how the alternatives would affect scenery is in the scenic integrity objectives (SIOs) adopted for each alternative and the level at which various management activities are evident or meet an acceptable threshold of dominance. The term "scenic integrity objective" refers to the degree of acceptable visual alteration of the landscape and is defined as a desired level of scenic excellence based on physical and sociological characteristics of an area. Typically, more stringent or very high SIOs are incorporated to protect the most highly visible and frequently seen areas that have the greatest variety in vegetation and other naturally occurring features. SIOs are rooted in the Scenery Management System (SMS). The SIOs applicable to the Kaibab NF revised forest plan are:

Very High: The characteristic landscape is intact, with only minute deviations.

High: The characteristic landscape appears intact. Deviations may be present, but must repeat form, line, color, texture, and pattern common to the landscape character so completely and at such a scale that they are not evident.

Moderate: The landscape appears slightly altered. Noticeable deviations are visually subordinate to the landscape character.

Low: The landscape appears moderately altered. Deviations may be dominant, but are shaped to borrow from the natural landform and other visual dominance elements (line, form, texture, color), and are subordinate to the characteristic landscape when viewed as a background.

Probable management activities related to the alternatives were used to evaluate or predict long- and/or short-term effects on scenery. Activities were evaluated in relation to their ability to meet or exceed forestwide desired SIOs established in the revised forest plan.

This analysis used the running averages of acres of ponderosa pine and frequent fire (dry) mixed conifer treated by wildland fire, acres mechanically treated (thinned), and acres for potential wilderness areas from the objectives for each alternative as a fixed number per year in order to make broad comparisons between alternatives.

Heritage Resources

Data on Kaibab cultural resources used for this analysis are derived from field data collected over several decades. Since the 1960s, archaeologists have conducted over 1,700 intensive pedestrian surveys for cultural resources in advance of Federal undertakings under Sections 106 and 110. In this manner, approximately 30 percent of the forest has been surveyed for heritage resources and over 9,600 archaeological sites have been identified and documented. Spatial data for all of these surveys and sites are maintained in the Kaibab Heritage Resource Geodatabase. In addition, the Forest Service uses the INFRA database system to maintain descriptive data on each heritage property. Such data include site condition, site type, and monitoring information. This analysis combines both INFRA and Geodatabase data.

Transportation

Information related to the forest road system was obtained from the Infra Database (I-Web), the database of record for the transportation system and facilities, and from the Kaibab Geographic

Information System (GIS). GIS is a spatial tool and is linked to the Infra Database. The data include but are not limited to miles of roads, maintenance levels of roads, features of the roads (culverts, grade dips, cattleguards, etc.), road management objectives, maintenance items, and costs. The data reflect the current motorized transportation system and administrative facilities to the best of our available knowledge, how the forests have been managing the motorized transportation system and administrative facilities, and how the public has been using the motorized transportation system.

Socioeconomic Analysis

The socioeconomic affected environment was described by a number of demographic variables including: assessment area population (growth and density), age and gender, education, ethnicity, and poverty status. Economic variables included in the description of the affected environment included income and (un)employment, economic diversity, and Kaibab NF payments to counties. Data were obtained from a variety of published sources including: the University of Arizona, U.S. Bureau of Census, U.S. Bureau of Economic Analysis, and the U.S. Bureau of Labor Statistics. Additionally, data and information were provided by the Forest Service TEAMS Enterprise Unit in a Socioeconomic Resource Report (Eichman and Jaworski 2012)

The potential consequences of alternative management scenarios on the socioeconomic environment were evaluated by economic impact analysis and financial efficiency analysis. Economic impact analysis estimates the employment and labor income consequences of forest management actions. Economic impacts were modeled using IMPLAN[5] Professional Version 3.0 with 2009 data. Economic impacts were presented in terms of employment (jobs) and income resulting from the different alternatives.

Financial efficiency analysis was conducted with QuickSilver[6] Version 6. Data on program revenues were collected from the Final National Forest Statement of Receipts (ASR-13-1). Data on program costs were provided by the Kaibab NF budget staff. These figures are based on average expenditures over the past 5 fiscal years (FY 2006 to 2010). We cannot predict or assume increases or decreases in budget levels, therefore the forest budget data are held constant over the 10-year period and are applicable to all alternatives. Financial efficiency analysis compares forest expenditures and revenues for the expected life (10 to 15 years) of the forest plan.

[5] IMPLAN (IMpact analysis for PLANing, Minnesota IMPLAN Group, Inc.), is a regional economic impact analysis system that uses county level, input-output data to determine the extent to which these activities (such as livestock grazing or timber harvest) contribute to the local economy. Input-output analysis traces linkages among the structural parts of an economy.

[6] QuickSilver is a program for economic analysis of long-term, on-the-ground resource management projects. It provides a consistent benefit/cost framework to determine if one management action costs less or has a better payoff than others.

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Appendix C. Timber Suitability Calculation, Financial Analysis, ASQ, and LTSY

National Forest System (NFS) lands were reserved with the intent of providing goods and services to satisfy public needs over the long term. These goods include the production of a sustainable supply of forest products. The NFMA requires that NFS lands be classified as to their suitability for timber production. Timber production is defined as "the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees… for industrial or consumer use" (36 CFR 219.3).

Calculating Acres of Suitable Timber

A multistep GIS analysis was conducted on all NFS lands managed by the Kaibab National Forest (NF) to categorize acres of land as suitable and not suitable for timber production.

The 1982 Planning Rule provisions state that lands within any one of the categories described below shall be identified as not suited for timber production:

1. The land is not "forest land."[6]
2. Technology is not available to ensure timber production from the land without irreversible resource damage to soils productivity or watershed conditions.
3. There is not reasonable assurance that such lands can be adequately restocked.
4. The land has been withdrawn from timber production by an Act of Congress, the Secretary of Agriculture, or the Chief of the Forest Service.

The analysis began by removing lands within the Kaibab NF boundary not administered by the forest: Equation 1: Finding All NFS Lands

All NFS Lands = Forest boundary – Land not managed by Kaibab NF

where "forest boundary" is the Kaibab NF boundary layer and "land not managed by the Kaibab National Forest" includes Camp Navajo and lands of other ownership.

Next, lands not suitable for timber production were isolated based on the four categories outlined in the planning rule provisions as well as lands classified as "nonindustrial" (which include lands incapable of producing industrial wood or lands producing trees not currently utilized or not expected to be utilized for timber production) were included:

Equation 2: Finding Lands Not Suitable for Timber Production

[6] Forest land is defined as "land at least 10 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use" (36 CFR 219.3).

$$\textit{Not suitable for timber production} = \sum \begin{matrix} \textit{Non-Forested} \\ \textit{Withdrawn} \\ \textit{Irreversible resource damage} \\ \textit{Adequate restocking not assured} \\ \textit{Nonindustrial} \end{matrix}$$

Timber component codes (Timco), vegetation cover type from the vegetation stands GIS layer, and existing wilderness areas were used to classify lands into the categories not suitable for timber production (table C 1). Timcos are codes assigned to each stand in the vegetation database that identify areas of suitability or non-suitability for timber production and also identify areas of management for activities other than timber production. More detailed descriptions of Timco codes are contained in the Rocky Mountain Resource Information System User Guide (RMRIS) Data Dictionary, Appendix 12 (USDA Forest Service 2002). The Kaibab NF updates the vegetation database when changes in management or site specific information indicate a change to suitability for timber production.

Table C 1. Categories of lands not suitable for timber production and the specific attributes used to classify these categories

Not Suitable for Timber Production Category	Specific Attribute Used to Categorize
Lands of other ownership	Timco = 001 and 100 (water) and 200 (non-forest)
Withdrawn lands	Timco = 300 (withdrawn by law or pending final action) and 301 (existing wilderness areas)
Irreversible resource damage	Timco = 730 (irreversible resource damage-general), 720 (current techniques prevent harvesting), 721 (topography limitations), 722 (does not meet plan criteria), and 700 (unsuitable timberland) where the cover type was ponderosa pine, Douglas-fir, treeland, or white fir.
Adequate restocking not assured	Timco = 710 (e.g., naturally open areas due to microclimates, etc.)
Nonindustrial	Timco = 900 (nonindustrial–incapable of producing industrial wood), 901 (nonindustrial–aspen), 950-963 (suitable woodlands), 970 (unsuitable woodlands), and 700 (unsuitable timberland) where the cover type was aspen, pinyon-juniper, juniper, oak, and any other hardwoods.

Lands tentatively suitable for timber production were then calculated by subtracting unsuitable timber lands (Equation 2) from the "All NFS Lands" layer (Equation 1):

Equation 3: Finding Lands Tentatively Suitable for Timber Production

$$\textit{Tentatively Suitable (TS)} = \textit{All NFS Lands} - \textit{Not suitable for timber production}$$

Table C 2 displays the results of these calculations. The categories in table C-1 apply to all alternatives, so the tentatively suitable land does not differ by alternative.

Table C 2. Calculation of acres of land tentatively suitable (same for all alternatives)

Category	Acres by Alternative			
	A	B	C	D
All NFS lands	1,543,265*			
Non-forested (includes nonindustrial)	-847,376			
Irreversible resource damage	-54,265			
Adequate restocking not assured	-21,834			
Withdrawn (219.14(a)(4))	-117,563			
Subtotal: Lands not suitable for timber production	*1,041,038*			
Lands tentatively suitable for timber production (All NFS lands minus "not suitable" categories)	**502,227**			

* Acreages of NFS lands may vary slightly over time due to factors such as resurvey, improved mapping technology, and updates to corporate GIS layers.

The next stage of the analysis determined areas not appropriate for timber production. These include areas that are either not desirable or not feasible to manage for periodic harvests of forest products and lands where management prescriptions preclude timber production, where management requirements cannot be met, and where harvest would not be cost efficient in meeting timber objectives.

Equation 4: Finding Tentatively Suitable Lands Not Appropriate for Timber Production

$$\textit{TS Lands Not Appropriate for Timber Production} = \sum_{\substack{\textit{Mgmt prescription precludes timber production} \\ \textit{Management requirements cannot be met} \\ \textit{Not cost efficient in meeting timber objectives}}}$$

The lands "not appropriate for timber production" vary by alternative. Table C 3 outlines these differences.

Table C 3. Categories of not appropriate for timber production by alternative

Not Appropriate for Timber Production Category	Alternative A	Alternative B	Alternative C	Alternative D
Management prescriptions preclude timber production	Timco = 800, 801, and 803 (incompatible with multiple-use critical wildlife habitat), plus 813 (developed recreation sites), plus any developed recreation sites currently coded as suitable.	Same as alternative A, plus alternative B recommended wilderness, plus grassland PNVTs previously classified as suitable for timber production	Same as alternative B, plus areas within the North Kaibab Wildlife Habitat Complex that were previously classified as suitable for timber production, plus recommended wilderness under alternativess C and D	Management prescriptions would preclude all lands from timber production.
Management requirements cannot be met	Timco = 820 (minimum mgmt requirements for resource protection, vegetative manipulation, silvicultural practices, even-aged management, riparian areas, soil and water, and diversity cannot be met).	Timco = 820	Timco = 820	N/A
Not cost efficient in meeting timber objectives (see further explanation below)	Timco = 850-880 (cost efficiency– low product value, road concerns, isolated patches, high logging costs)	Same as Alternative A, plus isolated polygons under 160 acres that were suitable in Alternative A.	Same as Alternative B (resulting acres differ because of areas previously removed due to management prescriptions).	N/A

Finally, lands suitable for timber production were determined for each alternative as follows:

Equation 5: Finding Lands Suitable for Timber Production

Suitable for Timber Production = Tentatively Suitable – TS Lands Not Appropriate for Timber Production

Calculated acres for each category and alternative are displayed in table C 4.

Table C 4. Calculations for acres not appropriate for timber production by alternative. Negative values indicate acres that were removed from the lands tentatively suitable for timber production

Land Category	Acres by Alternative			
	A	B	C	D
Tentatively suitable for timber production	502,227			
Mgmt prescriptions preclude timber production	-80,829	-90,782	-249,207	-501,046
Management requirements cannot be met	-20,298	-16,903	-10,944	N/A
Not cost efficient in meeting timber objectives	-141	-13,025	-11,520	N/A
Subtotal: Not appropriate for timber production	*-101,268*	*-120,710*	*-271,671*	*-501,046*
Total suitable for timber production	**400,959**	**381,517**	**230,556**	**0**

Many mostly small areas were identified as "not cost efficient" in meeting timber objectives due to the excessive costs (e.g., road construction) and low/negative returns that would be associated with timber harvesting (preparation/logging costs) and removal (haul costs) in these areas. These include small portions of otherwise suitable land with low product value (Timco 850), high road construction costs (Timco 860), high logging costs (Timco 880), or areas that exist as isolated patches of otherwise commercial timberland (Timco 870). Additionally, under alternatives B and C, other isolated patches of timber lands less than 160 acres were removed from the suitable timber base.

Cost efficiency is an important consideration in determining timber suitability. For example, road construction costs range from $15,000 to $25,000 per mile compared to reconstruction costs for existing roads, which range between $5,000 and $8,000 per mile. Once new roads are constructed, they must be either maintained at an average cost of $500 to $800 per mile each decade or be obliterated and seeded at an estimated cost of $2,000 per mile. In many of these areas, harvest volumes are low and harvest preparation and logging costs are excessively high. When ground-based mechanical (tractor) logging is not feasible and other harvesting systems (e.g., cable/helicopter) are required, logging costs generally increase by 200 to 500 percent. In areas that would have very high operating costs, regular entry for purposes of timber production is not financially feasible. This is particularly true under the current conditions, where even on tractor-operable and currently roaded areas, all prescriptions have negative present net value (table C 7). Due to the associated high costs and/or limited returns to harvest-limited commercial volume, lands identified as not cost efficient were removed from the suitable timber base.

Figure C 1 depicts suitable timberlands by each alternative. Alternative D removes all lands on the Kaibab NF from the suitable timber base, so this alternative is not mapped.

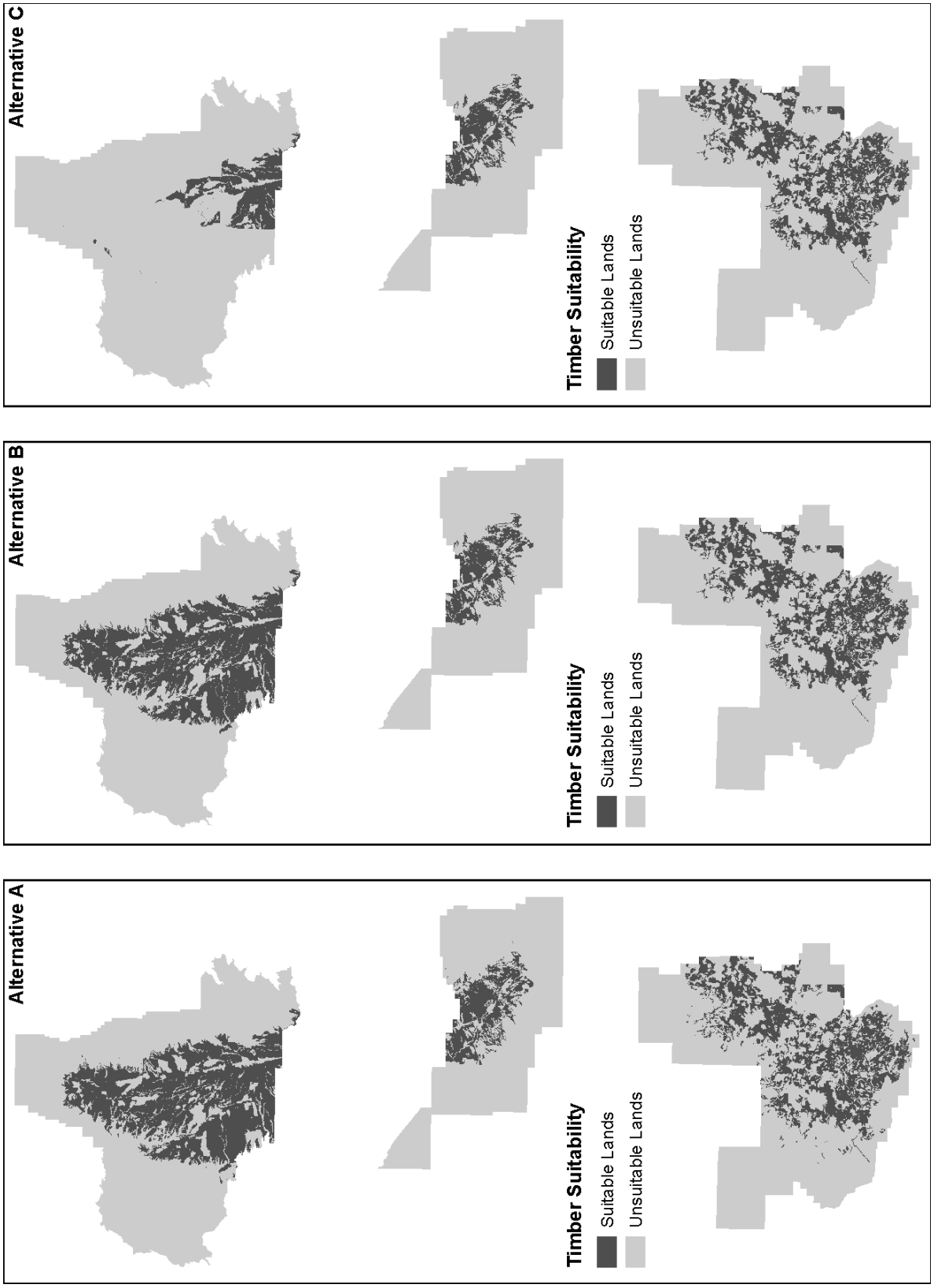

Figure C 1. Suitable timberlands for each alternative (Note: Alternative D has no suitable timber lands).

Financial Evaluation

The Planning Rule provisions at Section 219.14(b) also require that forest lands determined suitable for timber production "shall be further reviewed and assessed… to determine the costs and benefits for a range of management intensities for timber production." To meet this requirement, the Kaibab NF used the financial evaluation spreadsheet from the WO/EMC TIPS Web site. The spreadsheet incorporates information regarding harvest volumes, revenues, and costs over time to calculate the per acre present net value (PNV) at discount rates of 3, 4, and 7 percent. The spreadsheet was completed based on the guidelines contained in plan alternatives for those acres identified as tentatively suitable (see EXCEL spreadsheet FEIS Timber Suitability PNV Analysis 2_2013 in the project record).

The management intensities/prescriptions applied in alternatives and analyzed are: free thin all sizes to an assumed average target basal area of 50 square feet per acre, group select with matrix thin to an assumed average target basal area of 60 square feet per acre, and thin under diameter limit 16 inches d.b.h. to an assumed average target basal area of 60 square feet per acre. Data and methods used to estimate PNV for each alternative are described below.

Alternative A

The average revenue/ccf was based on actuals for the years 2006 to 2010. These data were obtained from USFS Cut and Sold Reports. The average calculated revenue was $6.72/ccf (see EXCEL spreadsheet FEIS Timber Suitability PNV Analysis 2_2013 in the project record). The estimated per acre harvest volume of 4.77 ccf is based on the volumes produced for acres treated, by prescription, by VDDT state (see EXCEL spreadsheets Acre&Vol data Timb Suitability and Recalculation of MCD & PP vols NKRD & South Zone in the project record).

Alternative B

The information used to estimate volumes, costs, and revenues for alternative B is based on estimates produced for the Four Forest Restoration Initiative (4FRI) project/contract. These data are summarized and presented in tables C 5 and C 6. The majority of the timber harvested on the South Zone over the next 10 years is expected to be under 4FRI contracts. While the North Kaibab Ranger District is not included in the 4FRI contract, the same data are used since the prescriptions applied will be the same on the North Kaibab Ranger District (in accordance with the forest plan).

Table C 5. Estimated average volume (green tons), by size class, removed under 4FRI contract on the Williams Ranger District

Green Ton Estimates	Size Class				
	0-5.9"	6-8.9"	9-11.9"	12+"	Tons/Acre
	Green tons per acre (goods)				
Average	0.00	2.30	4.41	11.92	18.63
	Green tons per acre (residue)				
Average	0.69	1.53	2.38	4.41	9.01
	Green tons per acre (total)				
Average	0.69	3.83	6.79	16.33	27.64

Table C 6. Estimated costs (residue/biomass) and revenues (goods) for volumes removed under the 4FRI contract on the Williams Ranger District

	PP 0-5.9"	PP 6-8.9"	PP 9-11.9"	PP 12.0"+	Totals
Total green tons per acre	0.69	3.83	6.79	16.33	27.64
% green ton residue	100%	40%	35%	27%	
$ per green ton goods	$3.50	$3.50	$3.50	$3.50	
$ per green ton residue	($3.50)	($3.50)	($3.50)	($3.50)	
Green ton goods per acre	0.00	2.30	4.41	11.92	18.63
Green ton residue per acre	0.69	1.53	2.38	4.41	9.01
$ per acre for goods	$0.00	$8.04	$15.45	$41.72	$65.21
$ per acre for residue	($2.42)	($5.36)	($8.32)	($15.43)	($31.53)
Total $ to Forest Service per acre	($2.42)	$2.68	$7.13	$26.29	$33.68

Alternative C

In alternative C, the free thin all sizes to an assumed average target basal area of 50 square feet per acre and group select with matrix thin to an assumed average target basal area of 60 square feet per acre prescriptions are applied only on the South Zone. Volume, cost, and revenue estimates for the North Kaibab Ranger District were based on those associated with the thin under diameter limit 16 inches to an assumed average target basal area of 60 square feet per acre prescription. Weighted averages were calculated based on these assumptions. Detailed methods and calculations are found in EXCEL spreadsheet FEIS Timber Suitability PNV Analysis 2013 in the project record.

Alternative D

Under alternative D, there are no suitable timber lands. The analysis for alternative D is completed and presented for regulatory and informational purposes. The only prescription analyzed under alternative D was the thin under diameter limit 16 inches to an assumed average target basal area of 60 square feet per acre prescription.

Under these cost and revenue assumptions, all estimated net revenues were negative (table C 7). The thin under 16 inches diameter to target basal area of 60 square feet per acre produced the highest negative values at all discount rates.

Table C 7. Per acre present net value (PNV), by alternative

PNV by Discount Rate	Alternative A	Alternative B	Alternative C	Alternative D
Undiscounted net revenue	-$2,916.89	-$1,828.66	-$2,089.24	-$3,280.74
PNV @ 3%	- $662.87	- $405.56	- $462.69	- $747.53
PNV @ 4%	- $554.67	- $336.80	- $384.99	- $626.72
PNV @ 5%	- $423.95	- $252.64	- $290.27	- $481.33

The Planning Rule Provisions at Section 219.14(c) require a consideration of costs and benefits for alternative management of the lands as identified in 219.14.b (TABS 2010). Management prescriptions (in this case for timber harvest) shall be defined to meet management objectives for the various multiple uses including outdoor recreation, timber, watershed, range, wildlife and fish, and wilderness. It should be noted that in the revised Forest plan, there are no objectives for timber output (thousand board feet (MBF) or hundred cubic feet (CCF). However, there are objectives for acres of mechanical treatment to achieve or progress toward desired conditions. Unlike the previous forest plan (1987), the revised plan is focused on outcomes, not outputs.

Lands were identified as “suitable for timber production” when the strategy for achieving and maintaining the desired conditions and objectives would involve planned, periodic timber harvests. Designation of “lands suitable for timber production” does not imply that management would be focused on maximizing timber yields, only that periodic harvests are expected to occur as a tool for achieving or maintaining desired conditions with a minimum level of regeneration (Youtz and Vandendriesche 2011).

The forest objective relative to the mechanical harvest of trees is the number one priority need for change:

- Modify stand structure and density toward reference conditions and restore historic fire regimes.

The provisions at Section 219.12(f)(8) state that each alternative shall represent to the extent practicable the most cost efficient combination of management prescriptions examined that can meet the objectives established in the alternative.

By producing the least negative net revenue, the combination of free thin all sizes to an average target basal area of 50 square feet per acre and group select with matrix thin to an average target basal area of 60 square feet per acre are the most cost efficient combination of management prescriptions (table C 7).

Allowable Sale Quantity and Long-term Sustained Yield

The NFMA at Section 13 (limitations on timber removal) and the 1982 Planning Rule Provisions at Section 219.16 (timber resource sale schedule) require that timber harvest levels be based on the principle of sustained yield. Long-term sustained yield (LTSY) is the uniform wood yield from lands being managed for timber production that may be sustained under a specified management intensity consistent with multiple-use objectives. Allowable sale quantity (ASQ) is

the quantity of timber that is planned to be sold from the suitable timberland covered by the forest plan for a time period specified by the plan. ASQ is usually expressed on an annual basis as the "average annual allowable sale quantity" because it may be exceeded in a given year as long as the 10-year average is not exceeded. ASQ and LTSY apply only to those lands that are suitable for timber production where there is intent to have regular harvests that produce commercial timber products.

These provisions allow for the establishment of an ASQ to depart from (exceed) the projected LTSY provided that such planned departure is consistent with and leads to the better attainment of multiple-use management objectives.

The ponderosa pine and dry mixed conifer PNVTs are currently departed from reference conditions in terms of density, structure, and susceptibility to unnatural high-severity crown fire. In order to make progress toward the desired conditions in the ponderosa pine and frequent fire mixed conifer vegetation types, timber harvest levels will need to be significantly higher than the estimated LTSY until the desired density and structure is attained. LTSY is roughly equal to production or growth that can be sustained over time. LTSY is only applicable once the desired structure and density have been achieved.

Tables C 8 through C 13 display ASQ calculations for the ponderosa pine and dry mixed conifer PNVTs for the revised plan (alternative B), based on the VDDT analysis described in the Vegetation and Fire Specialist Report. The shaded boxes indicate the VDDT states (see appendix B) to which each prescription can be applied and from which volumes can be produced. Volumes in shaded boxes were the only volumes used to calculate PNV, ASQ, and LTSY.

The following is the key to vegetation condition descriptions for VDDT States referenced in tables C-8 through C-13:

C_SMO = small, open

D_MOS = medium, open, single story

E_VOS = very large, open, single story

F_SSC = seedling/sapling, closed

G_SMC = small, closed

H_MCS = medium, closed, single story

I_VCS = very large, closed, single story

J_MOM = medium, open, multistory

K_VOM = very large, open, multistory

L_MCM = medium, closed, multistory

M_VCM = very large, closed, multistory

Table C 8. Average yield per acre (CF) in ponderosa pine/grass PNVT by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target basal area 50 square feet per acre											
5 - 9" d.b.h. (CF) for ASQ Calcs	5.90	25.48	10.78	31.75	371.44	153.91	25.28	15.10	15.14	154.14	124.16
9+" d.b.h. (CF) for ASQ Calcs	0.00	142.37	353.40	76.43	263.63	534.30	2,374.48	220.55	508.61	805.89	1,700.99
Group selection with matrix thin to 60 square feet per acre											
5 - 9" d.b.h. (CF) for ASQ Calcs		22.23	0.00	0.00	0.00	140.56	0.90	11.86	4.53	112.15	82.04
9+" d.b.h. (CF) for ASQ Calcs		78.48	260.28	0.00	0.00	523.83	1,442.56	93.62	279.70	771.45	1,293.04

Table C 9. Average annual acres treated in ponderosa pine/grass PNVT by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target BA 50 ft^2/ac	0	0	0	213	662	0	0	0	0	0	0
Group Selection with matrix thin to 60 ft^2/ac	0	2022	1366	0	0	4,209	823	0	0	4,201	472

Table C 10. Average annual yield (CF/ac x acres) in ponderosa pine/grass by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target basal area 50square feet per acre											

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
5 - 9" d.b.h. (CF) for ASQ Calcs				6,755	245,988						
9+" d.b.h. (CF) for ASQ Calcs				16,260	174,589						
Group selection with matrix thin to 60 square feet per acre											
5 - 9" d.b.h. (CF) for ASQ Calcs		44,936	0			591.608	743			471,132	38,705
9+" d.b.h. (CF) for ASQ Calcs		158,675	355,636			2,204,706	1,187,609			3,240,787	610,003

Table C 11. Average yield per acre (CF) in dry mixed conifer PNVT by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target basal area 50 square feet per acre											
5 - 9" d.b.h. (CF) for ASQ Calcs	0.00	8.75	20.47	36.97	247.57	158.40	0.00	23.09	12.38	142.61	63.39
9+" d.b.h. (CF) for ASQ Calcs	2.47	95.74	70.02	409.89	416.73	987.15	2,157.45	220.55	508.61	901.02	1,442.85
Group selection with matrix thin to 60 square feet per acre											
5 - 9" d.b.h. (CF) for ASQ Calcs		0.00	0.00			129.85	0.00	15.84	0.00	106.55	13.74
9+" d.b.h. (CF) for ASQ Calcs		31.38	77.26			748.70	1,530.37	65.96	367.04	658.07	1,008.88

Table C 12. Average annual acres treated in dry mixed conifer PNVT by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target basal area	0	0	0	296	101	0	0	0	0	0	0
Group select with matrix thin	0	0	0	0	0	435	61	0	0	465	394

Table C 13. Average annual yield (CF/ac x acres) in dry mixed conifer by prescription, by applicable VDDT state

Prescription	C_SMO	D_MOS	E_VOS	F_SSC	G_SMC	H_MCS	I_VCS	J_MOM	K_VOM	L_MCM	M_VCM
Free thin all sizes to target basal area											
5 - 9" d.b.h. (CF) for ASQ Calcs				10,942	25,004						
9+" d.b.h. (CF) for ASQ Calcs				121,327	42,090						
Group selection with matrix thin											
5 - 9" d.b.h. (CF) for ASQ Calcs						56,484	0			49,546	5,415
9+" d.b.h. (CF) for ASQ Calcs						325,683	93,535			306,004	397,497

Note: All dry mixed conifer PNVT acres treated and volumes removed come from the North Kaibab Ranger District.

LTSY calculations provided by the Southwestern Region (Youtz and Vandendriesche 2011) were used for the Kaibab NF LTSY estimates. Table C 14 displays the ASQ and LTSY for each alternative.

Table C 14. Allowable sale quantity and long-term sustained yield, volumes (CCF) by alternative

	Alternative A*	Alternative B	Alternative C	Alternative D
Allowable sale quantity	152,300 CCF+	107,815 CCF	60,970 CCF	0
Long-term sustained yield	216,200 CCF	74,737 CCF	45,148 CCF	0

* Volumes shown for alternative A are from the current forest plan

CCF = hundred cubic feet

Alternative A is the current plan, which had a goal that emphasized timber production primarily using even-aged management. Under the previous forest plan (1988), the objective was to increase timber yield each decade until it reached the desired long-term sustained yield. The timber production level expected in the first 10 years of the current plan was 22.9 million cubic feet per year. The highest volume removed on the Kaibab NF for any year in the past 30 years was 17.25 million cubic feet (1987). The potential volumes identified in the original plan were never achieved. Over the past five years, the annual volume sold on the Kaibab NF has ranged between 10,000 and 15,000 CCF. The harvest volume levels under alternative A were not achieved, and would no longer be desirable because the desired conditions have shifted from relatively young even-aged under the old plan to relatively old uneven-aged structure under the proposed new plan.

The suitable timber lands are currently highly departed in terms of density, structure, and susceptibility to unnatural high-severity crown fire. As a result, alternatives B and C have an ASQ that is higher than the LTSY. This planned departure from the LTSY will be needed for at least seven decades to achieve the desired density and structure consistent with other multiple-use management objectives.

Under alternative D, there are no lands identified as suitable for timber production. As a result, the ASQ and LTSY for alternative D is zero.

Figure C 2 assumes full capacity to implement mechanical thinning at the rate identified in the objectives in the plan. Actual capacity may be limited due to lack of product utilization infrastructure, budget, or successful project planning. Although the estimated number of years in each phase of departure would vary depending on the actual implementation rates, the pattern is expected to remain roughly the same. The total time from plan implementation to achievement of the desired density and structure is estimated to be between 70 and 100 years, with a minimum of 20 years between treatments designed to achieve uneven-aged structure. Note that due to the current lack of infrastructure, the volumes during the first period may actually start below the ASQ and climb before flattening out at or near the ASQ.

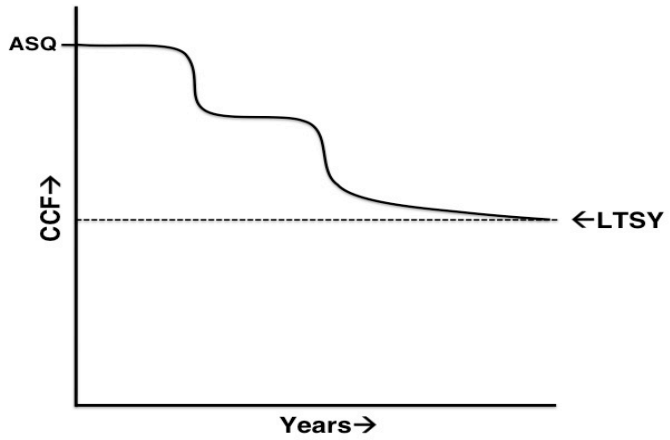

Figure C 2. Pattern of estimated departure between ASQ and LTSY for alternatives B and C

In the first two to three decades, volumes removed are expected to remain relatively stable. During this time, the forest would focus mechanical thinning efforts in the areas most at risk of loss to crown fires. These are the areas containing the greatest percentage of dense states that are dominated by trees in the larger size classes. These states are given higher priority because they are at risk of loss from uncharacteristic high-intensity wildfire, and it would take longer to replace the larger trees if they are lost (more than 100 years). The uneven-aged dense states dominated by large trees could potentially be treated to the desired open, uneven-aged state in one treatment. Once the desired density and structure is achieved, the areas would no longer contribute to the departure. Following the initial treatments in the even-aged, dense, large tree-dominated sites, the desired density would be achieved. However, these areas would not have the desired uneven-age class distribution, even with the new age cohort (regeneration) that would be expected following the initial treatment. These two-aged areas would be scheduled for a second treatment in phase two in order to progress toward or accomplish the desired uneven age condition.

Once all of the suitable areas in the dense large tree states (H, I, L, and M) have had one treatment (minimum of 25 years), the volume would drop and stabilize for another one or two decades, even though the implementation rate for mechanical restoration would be similar to the first period. During this second phase, the original dense even-aged states would receive a second treatment establishing new regeneration, and the younger dense states (F and G) would receive their first treatments. While implementation rates are expected to be stable, lower yields would likely result because the smaller dense states yield about half the volume of the larger states, and because the intensity of treatments on the second treatment of the areas in the larger states is expected to be lower than the first treatment. With a second treatment establishing a third age class, most of these stands would be in the desired uneven-aged open state and would no longer contribute to the departure.

In the third phase, the volumes would drop again to just above the LTSY level and then taper off to a zero departure, where harvest/ASQ would be equal to LTSY. During this last phase of departure, the areas with one or two age classes would receive their final restructuring treatments to establish regeneration and reduce density which would release the largest trees (component most lacking) so that they may grow more quickly and achieve the desired larger diameters. When all suitable timberlands are in the desired open uneven-aged condition, the yield of wood produced and harvested would stabilize at the identified LTSY. All treatments thereafter would

focus on maintaining the desired conditions over time, while yielding a sustainable supply of wood in perpetuity.

Note that commercial wood volume may be produced from restoration treatments on non-suitable timberlands. On non-suitable timberland (all lands under alternative D), mechanical thinning would only be used to achieve the desired stand structure and density that would reduce large crown fire potential. Thereafter, the desired density would be maintained with fire. There is no long-term sustained yield or allowable sale quantity assigned to non-suitable areas.

References

USDA Forest Service. 2002. Rocky Mountain Resource Information System (RMRIS) Data Dictionary: Appendices and Indices.

Youtz, J. and D. Vandendriesche 2012. White paper K: LTYSC – Long term sustained yield calculations: the R3 FVS process for evaluating the effects of vegetation management activities in the forest plan revision process. Albuquerque, NM: Forest Service Southwestern Regional Office, Department of Agriculture.

Appendix D. Grazing Suitability and Capability

The 1982 Planning Rule requires that the suitability of rangelands on NFS lands and their capability for producing forage for grazing animals be determined in forest planning. Capability is the potential of an area of land to produce resources and supply goods and services. Capability depends upon conditions such as climate, slope, landform, soils, and geology. Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Lands within the plan area are not suitable if livestock grazing would be incompatible with the desired conditions or result in substantial and permanent impairment of the land.

Capability to produce forage for grazing animals was determined for the original forest plan. Most landscape-scale conditions that influence capability have not changed significantly since the initial evaluation. However, the data and analysis tools used in the initial determination were not as accurate or precise as what is available today. Capability for this plan was reassessed using the corporate GIS data. Table D 1 displays the results of this analysis. The area capable for livestock grazing has about 12 percent fewer acres than the original forest plan. More detail about the process and rationale behind these calculations are documented in the white paper Grazing Capability Calculations for the Kaibab National Forest, which is filed in the project record.

Table D 1. Grazing capability calculations for the Kaibab National Forest

Grazing Capability Category	Acres
Gross area of Kaibab NF	1,600,321*
Area not administered by the Forest Service (Camp Navajo and private lands)	-57,056
Net Analysis Area	*1,543,265*
Slopes greater than 40 percent	-165,672
Severe erosion hazard (terrestrial ecosystem survey)	-176,554
Forage productivity less than 100 lb/ac/yr (based on TES)	-87,921
Total “no capability” areas	-430,147
Lands tentatively capable for livestock grazing	1,113,118

* Acreages of NFS lands may vary slightly over time due to factors such as resurvey, improved mapping technology, and updates to corporate GIS layers.

The original plan identified four management areas as unsuitable for livestock grazing: the Arizona Bugbane Botanical Area, Garland Prairie, Franks Lake Geologic/Botanic Area, and developed recreation sites. These management areas are still identified as unsuitable, but a 219-acre adjustment was made to the area managed as developed recreation sites. Two developed recreation sites have been closed since the original plan was signed and they are no longer managed for recreation: Moqui Lodge and Benham Snowplay Area, 202 and 17 acres, respectively. The desired conditions for these areas would no longer preclude livestock grazing. As a result, this revised plan shows these areas as suitable for livestock grazing..

Since the original plan was approved, each allotment on the Kaibab NF has received site-specific environmental review for the authorization of grazing consistent with the National Environmental

Policy Act (NEPA). The grazing decisions for those site-specific analyses were reviewed for areas where livestock grazing was not authorized. Site specific NEPA identified three large contiguous areas that were not authorized for grazing: Kanab Creek allotment, Jump-up pasture of the Central Winter allotment, and the Bill Williams Mountain portion of the Hat allotment. In this revised plan, these areas have been identified as not suitable for livestock grazing. Table 3 and Figure 5 show the areas on the Kaibab NF where livestock grazing was not authorized. Of the approximately 1.1 million acres identified as tentatively capable 14,274 acres were identified as not suitable due to incompatibility with desired conditions. The total area that is both capable and suitable is about 1.1 million acres.

Table D 2. Areas unsuitable for grazing on the Kaibab National Forest

Feature	Acres	Notes
Arizona Bugbane Botanical Area	490	Management areas closed to grazing in the original forest plan.
Garland Prairie	328	
Franks Lake Geologic/Botanic Area	145	
Existing Developed Recreation Sites	1,397	
Kanab Creek Allotment	39,280	Closed to grazing in site-specific NEPA decision in March 2001.
Jump-up Pasture, Central Winter Allotment	15,745	
Bill Williams Mountain, Hat Allotment	2,862	Closed to grazing in site-specific NEPA decision in September 2010.
Total area withdrawn from livestock grazing through previous site-specific decisions	**60,247**	Withdrawn areas contained 45,973 acres within their boundary that was not capable due to steep slope, erodable soils, and low productivity.
Tentatively capable lands that are not suitable	**14,274**	Total capable acres withdrawn from grazing due to incompatibility with desired conditions.

A suitable determination indicates that grazing is compatible with the desired conditions for the relevant portion of the plan area. It is guidance for project and activity decision making, and is not a commitment or a final decision. It does not mean that grazing will or will not occur in a particular area. The final decision to authorize livestock grazing and the determination for how lands are managed (including those that have been identified as not capable of producing forage), is made at the project or allotment level. The decision to authorize grazing and under what conditions is made following NEPA review at the grazing allotment level, under which site-specific conditions can be assessed and addressed through project design.

During site-specific NEPA review, the condition and trend of each of the Kaibab NF's allotments was assessed to ensure availability of forage and habitat for all species, including wildlife. A summary of these evaluations can be found in the project record. Although direct comparisons of these condition and trend analyses is difficult due to differences in methodology and reporting of results, range condition generally ranged from very poor to very good, with approximately 75

percent of allotments receiving ratings of poor or better. The majority of allotments had a trend of static to upward.

Range condition is a subjective expression (very poor, poor, fair, good, and excellent) and is evaluated relative to a standard that encompasses the composition, density, and vigor of the vegetation and the physical characteristics of the soil. Range trend expresses the direction of change in range condition over time in response to livestock management and other environmental factors. The methods used to evaluate range condition and trend are generally considered to be a process for determining condition and trend relative to the land's ability or value for grazing livestock and do not provide information regarding ecological status (Holechek et al. 1989). As such, there is not a strong correlation between range condition class and ecological condition; an area could be in a poor or fair condition simply because the area has a low value for livestock grazing.

References

Holechek, J.L., R.D. Pieper, and C.H. Herbel. 1989. Range Management Principles and Practices. Englewood Cliffs, NJ: Regents/Prentice Hall. 501 pp.

Appendix E. Wilderness Area Evaluation Summary

The National Forest Management Act (NFMA) requires that all areas meeting minimum criteria as wilderness be considered for recommendation for wilderness designation during plan revision. Recommended areas are those which are capable of providing wilderness experiences and character, are available for recommendation in comparison to other values that exist in the area, and respond to the need for additional wilderness in the National Wilderness Preservation System. This is a summary of the results of the Potential Wilderness Area Evaluation Report (KNF 2013), which can be found on the Kaibab National Forest (NF) Web site at http://fs.usda.gov/goto/kaibab/plan_revision.

The potential wilderness area (PWA) evaluation identified and inventoried all non-wilderness areas within the Kaibab NF that satisfy the definition of wilderness found in the 1964 Wilderness Act, which states:

> *"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an area of underdeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."*

Forest Service Handbook (FSH) direction (1909.12, Chapter 70) provides a three-step process for identifying and evaluating potential wilderness on National Forest System Lands. This process includes:

1. An inventory of potential areas;
2. Evaluation of potential areas; and,
3. Determination (by the decision maker for the Kaibab forest plan) if a recommendation will be pursued for any potential wilderness areas.

Inventory of Potential Wilderness Areas

In 2007, the Southwestern Region developed a Potential Wilderness Inventory process for use by National Forests in the Region. Through this process, the Kaibab NF identified areas that met the basic requirements of size, geography or adjacency to existing or recommended wilderness. In order for an area to be included in the potential wilderness inventory, it must meet the definition in the 1964 Wilderness Act and meet either criteria 1 and 3, or criteria 2 and 3 below.

1. Areas contain 5,000 acres or more.
2. Areas contain less than 5,000 acres, but can meet one or more of the following criteria:
    a. Can be preserved due to physical terrain and natural conditions.

   b. Self-contained ecosystems, such as an island, that can be effectively managed as a separate unit of the National Wilderness Preservation System.
   c. Contiguous to existing wilderness, primitive areas, Administration-endorsed wilderness, or potential wilderness in other Federal ownership, regardless of their size.
3. Areas do not contain forest roads (36 CFR 212.1) or other permanently authorized roads, except as permitted in areas east of the 100th meridian (sec. 71.12).

Areas may qualify for inventory of potential wilderness even though they include the types of areas or features listed in FSH 1909.12, Chapter 71.11 (e.g. historic mining, electronic sites, fences, water troughs, and corrals), providing their impact is minimal.

The Kaibab NF used a systematic process to identify areas (polygons) that met the inventory criteria. An automated GIS model was developed to identify polygons that met inventory criteria 1, 2c, and 3. The portion of this analysis determining the presence of roads utilized the most up-to-date motor vehicle use map. These polygons were then individually examined for inherent model errors such as polygons containing "dead-end" roads. Polygons were reshaped or completely removed if they contained dense networks of dead-end roads. When delineating the boundaries of areas, efforts were made to facilitate easy on-the-ground identification. During this examination the Kaibab NF also determined whether a polygon met inventory criteria 2a and 2b, and criteria from FSH 1909.12, Chapter 71.

The inventory process identified sixteen PWAs that were carried forward to the evaluation phase. A full description of the PWA inventory process can be found in Appendix A of this document.

Evaluation of Potential Wilderness Areas

After the initial inventory was completed, PWAs identified in the inventory were evaluated for capability, availability, and need:

1. Capability is an evaluation of the inherent characteristics of the potential area.
2. Availability is an evaluation of the value and need for wilderness compared to value and need for other resources or uses.
3. Need is an evaluation of the regional distribution of wilderness and representation of regional landforms and ecosystems.

Capability Analysis

The sixteen PWAs carried forward from the inventory process were evaluated for their capability. Basic wilderness capability characteristics were used to evaluate the initial suitability of a PWA for wilderness recommendation regardless of its availability or need as wilderness. Five principle wilderness characteristics (based on the Wilderness Act) were analyzed in this step (FSH 1909.2, Chapter 70, Section 72.1):

1. Natural–the degree to which the area is substantially free from the effects of modern civilization and generally appears to be affected primarily by forces of nature.
2. Undeveloped–the degree to which an area is without permanent improvements/human habitation.

3. Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation–the degree to which the area provides a wide range of experiential opportunities for feelings of solitude, isolation, and a part of nature free from evidence of humans.
4. Special Features and Values–the degree to which an area is capable of providing other values such as those with ecologic, geologic, scientific, educational, scenic, historic or cultural significance.
5. Manageability–ability to manage the area as wilderness as required by the Wilderness Act and how boundaries of the area affect its manageability.

A rating system was used to assess the wilderness character of each PWA. The specific criteria were developed by the Southwestern Regional Office with direction from the Forest Service Handbook 1909.12 Chapter 72.1. For each PWA, each criterion was assigned a high, medium, or low rating. These were then converted to numerical ratings using the following scale: a high rating received 3 points; a medium rating received 2 points; and low ratings received zero points. Each of the five wilderness characteristics—naturalness, undeveloped, solitude/primitive recreation, special features, and manageability—then received a rating of high, medium, or low based on the points given to its constituent criteria. The overall capability rating for a PWA was based on the total number of points earned in all five categories.

The rating criteria for capability are described in Table E 1. Table E 2 summarizes the capability ratings for the 16 inventoried PWAs on the Kaibab NF. The evaluation relied on professional knowledge regarding the unique, site specific conditions of each area being considered. More detail about the capability of each PWA is provided in the area-specific PWA evaluation summaries in this report. Figures E 1 and E 2 display the potential wilderness areas that were evaluated for capability as a part of this analysis.

Table E 1. Potential wilderness area capability rating criteria

Characteristic	Criterion	Rating*
Natural	Presence of non-native species	**High** – Non-native species are not evident
		Medium – Non-native species are evident in isolated spots
		Low – Non-native species are common or scattered throughout the area
	Seeps/springs within the area are in free-flowing condition	**High –** Seeps/springs are considered free-flowing (undeveloped)
		Medium – Some seeps/springs have development or other issues that affect their free-flowing character.
		Low – Springs/seeps are absent, seasonal or heavily impacted by development
	Quality of night sky as affected by light pollution	**High** – The night sky is clear with little to no interference from light pollution
		Medium – Some stars are visible and there is moderate degradation from light pollution
		Low –Few stars are visible at night and the presence of light pollution is evident
	Area provides elements of biological diversity and naturalness, including unique habitats, TES or rare plants & wildlife.	**High** – Has critical or unique habitats and diverse ecological conditions
		Medium – Has a mix of habitats and ecological conditions
		Low – Has limited ecological conditions and habitats
	Area contains a variety of natural resources, including a variety of tree species and structures. Intermingled grasslands or meadows, numerous recreation opportunities, diversity of wildlife habitats, and wildlife, etc.	**High** – Diverse amount of natural resources
		Medium – Mixed amount of natural resources
		Low – Limited amount of natural resource diversity
Undeveloped	Area is free from human disturbance	**High** – Has only minor improvements and appears free from human disturbance
		Medium – Has several minor improvements and is mostly free from human disturbance
		Low – Has major improvement such as a power line or road and shows signs of human disturbance
Outstanding opportunities for solitude or primitive and unconfined recreation	Area provides physically and mentally challenging recreation opportunities that promote adventure and self-reliance	**High** – Most of the area provides challenging recreation opportunities
		Medium – Some parts of the area have the potential for challenging recreation opportunities
		Low – Few parts of the area can provide challenging recreation opportunities
	Opportunity to experience solitude and isolation from human activities while recreating in the area	**High** – Significant feeling of being alone or remote from civilization
		Medium – Feeling of being alone is possible but signs of civilization are likely
		Low – Little opportunity of feeling alone
	Opportunity to engage in primitive and unconfined recreation such as back-packing, hunting, fishing, etc.	**High -** There are many opportunities for engaging in primitive recreation
		Medium – There are some opportunities for engaging in primitive recreation
		Low – There are few to no opportunities to engage in primitive recreation
	Degree of primitive ROS settings	**High –** Majority of the area is classified primitive or semi-primitive non-motorized

Table E 1. Potential wilderness area capability rating criteria

Characteristic	Criterion	Rating*
		Medium – Some of the area is classified primitive or semi-primitive non-motorized
		Low – Little to none of the area is classified primitive or semi-primitive non-motorized
Special Features and Values	Area contains outstanding or distinct features like rock formations, panoramic views, etc.	**High** – Many distinct features or few but exceptional features
		Medium – Some distinct features
		Low – One or no distinct features
	Area has potential for scientific research, environmental education, or historic/cultural opportunities	**High** – Good potential for two or more types of these opportunities
		Medium – Potential for one type of opportunity
		Low – Little or no potential for this type of opportunity
	Area contains unique or rare species of plants and/or animals	**High** – Area has several unique or rare plants and/or animals
		Medium – Area has a few unique or rare plants and/or animals
		Low – Area has no known unique or rare plants and/or animals.
Manageability	Ability to manage the area for wilderness character, including distance and influence from outside activities; opportunity to access the area; and resource conflicts or encumbrances	**High** – Isolated from areas of activity; controlled or limited access; no encumbrances or resource conflicts
		Medium – Somewhat isolated from areas of activity; adequate access opportunities; some resource conflicts and/or encumbrances
		Low – Areas of activity are nearby; many access opportunities; many resource conflicts and/or encumbrances
	Area boundaries are recognizable and defensible	**High** – Majority of boundary follows features that can be easily found and identified on the ground
		Medium – About half of the boundary follows features that can be easily found and identified on the ground
		Low – Boundary can rarely be located without equipment, such as a GPS unit

* Each criterion rating was assigned a numeric score: High= 3 points, Medium = 2 points, Low = 0 points

Table E 2. Summary of the Kaibab National Forest potential wilderness area capability ratings

Area Name, Size, PWA Number[a]	Capability Rating[b]					
	Natural	Un-developed	Outstanding opportunities for solitude or primitive, unconfined recreation	Special features and values	Manage-ability	Overall capability rating[c]
Saddle Mountain Addition: 1,296 ac PWA 03-07-043	Medium (2)	High (3)	High (3)	High (3)	High (3)	**14 = High**
Kanab Creek Additions: 4,710 ac PWA 03-07-034	Medium (2)	High (3)	Medium (2)	High (3)	High (3)	**13 = High**
Grassy/Quaking Aspen Canyons: 232 ac, PWA 03-07-099	High (3)	High (3)	High (3)	Medium (2)	Medium (2)	**13 = High**
Sycamore Canyon Addition: 988 ac PWA 03-07-057	Medium (2)	High (3)	High (3)	Medium (2)	High (3)	**13 = High**
Jacks Canyon: 156 ac PWA 03-07-999	Medium (2)	High (3)	High (3)	High (3)	Medium (2)	**13 = High**
Burro Canyon: 10,735 ac PWA 03-07-003	Medium (2)	High (3)	High (3)	Medium (2)	Medium (2)	**12 = Medium**
Coconino Rim: 7,750 ac PWA 03-07-079	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	**10 = Medium**
Seegmiller: 6,168 ac PWA 03-07-035	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	**10 = Medium**
Willis Canyon: 6,418 ac PWA 03-07-002	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	**10 = Medium**
South Canyon Point: 5,829 ac PWA 03-07-045	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	**10 = Medium**
The following PWAs were not carried forward to Availability analysis due to an overall "low" score:						
Sitgreaves Mtn: 10,016 ac PWA 03-07-073	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Low (0)	**8 = Low**
Red Point: 7,385 ac PWA 03-07-098	Low (0)	High (3)	Medium (2)	Low (0)	Low (0)	**5 = Low**
Big Ridge: 9,373 ac PWA 03-07-004	Low (0)	High (3)	Low (0)	Medium (2)	Low (0)	**5 = Low**
Red Butte: 2,682 ac PWA 03-07-088	Low (0)	Low (0)	Low (0)	Medium (2)	Medium (2)	**4 = Low**
Paradise Ridge: 10,444 ac PWA 03-07-134	Low (0)	Low (0)	Low (0)	Low (0)	Medium (2)	**2 = Low**
NW NKRD: 12,110 ac PWA 03-07-018	Low (0)	Medium (2)	Low (0)	Low (0)	Low (0)	**2 = Low**

[a] The first 5 PWAs are included based on the "contiguous to existing wilderness" criterion. Red Butte & Sitgreaves Mtn. are included because "they can be preserved due to physical terrain and/or natural conditions." The remaining PWAs are included based on the ≥5,000 acres criterion.

[b] Each criterion rating was assigned a numerical score: High = 3 points, Medium = 2 points, Low = 0 points.

[c] Overall capability rating: 13-15 = High (≥87%); 9-12 = Medium (60-86%); <9 = Low (<60%). Only PWAs with a >60% rating are carried forward to availability analysis.

Availability Analysis

Of the sixteen PWAs evaluated for capability, six were not carried forward into the availability and need assessments because they had a low capability rating (below 60%). The remaining ten PWAs were considered potentially available for wilderness designation. The availability analysis compares the resource tradeoffs and consequences of wilderness designation based on the qualitative and quantitative information about current and potential uses, outputs, trends for the various resources.

Availability of PWAs was evaluated on nine criteria: recreation, including tourism; information on wildlife species, populations, and management needs; water availability and use; livestock operations; timber; minerals; cultural resources; authorized and potential land uses; and management considerations, including fire, insects and disease, and presence of non-federal lands. Surface water is exceedingly uncommon on the Kaibab NF, and it was determined that available water within the PWAs only occurred as seeps and springs or developed livestock waters. The presence of seeps and springs is addressed in the capability analysis (described above), and the presence and use of livestock waters is included in the livestock operations question described below.

The availability rating of the ten remaining PWAs was determined by asking a question related to each of the resource categories and scoring based on the resulting availability. As with capability, the PWAs were assigned a high, medium, or low rating on each criterion. A high rating was worth 3 points, a medium rating was worth 2 points low ratings received zero points since the objective was to promote areas with outstanding wilderness qualities. More detail about the availability rating for each PWA is provided in the area-specific summaries in this report.

Table E 3 describes the rating criteria for availability. Table E 4 summarizes the availability ratings and associated scores for each of the ten PWAs under consideration.

Table E 3. Potential wilderness area availability rating criteria

Resource Area	Availability Question	Rating*
Vegetation (Timber)/ Fire Management	What have been or will be the impacts of existing//planned/needed management activities on the "wilderness character" of the PWA (includes timber harvest activities, invasive/noxious species eradication, and fire)?	**High** – Minimal or no existing/planned/needed activities
		Medium – Some existing/planned/needed activities
		Low – Many existing/planned/needed activities
Recreation and Tourism	What types of recreation or tourism occur in the PWA, and do they involve motorized or mechanized vehicle use (e.g. mountain bikes or ATVs)?	**High** – Primitive non-motorized/mechanized recreation/tourism only
		Medium – Semi-primitive non-mechanized/motorized vehicle use
		Low – User-created (social) mechanized/motorized vehicle trail use
Wildlife and Plants	Would wilderness designation result in increased protection and viability for federally listed or sensitive species within the PWA?	**High** – Federally listed or sensitive species are present and wilderness designation would improve protection and viability of these species
		Medium – Only one federally listed and/or sensitive species are present and wilderness designation would improve protection of these species
		Low – No federally listed or sensitive species are present and/or wilderness designation would not improve protection or viability
Livestock Operations	Are there active allotments and associated improvements (including water developments) within the PWA that are subject to periodic maintenance requiring the use of mechanized equipment?	**High** – No active allotments and/or improvements do not require maintenance with mechanized equipment
		Medium – Active allotment(s) are present but existing improvements do not require maintenance with mechanized equipment
		Low – Active allotments are present and improvements do require maintenance with mechanized equipment
Lands and Minerals	Are there patented lands, mining claims, surface occupancy leases, or abandoned mines/quarries with the PWA?	**High** – None of the above exist
		Medium – No patented lands, mining claims, or surface occupancy leases exist but some abandoned mines/quarries present
		Low – Any of the above (except abandoned mines/quarries) are present
Heritage and Cultural Resources	Are there prehistoric, historic, or ceremonial sites with the PWA and are they ever accessed using mechanized vehicles?	**High** – High density of sites that do not require mechanized vehicle access are present and wilderness designation would increase protection of sites
		Medium – Low to moderate density of sites that do not require mechanized vehicle access are present and wilderness designation would increase protection of sites
		Low – No to low density of sites are present or sites require mechanized vehicle access or wilderness designation would not increase protection of sites

*High = 3 points, Medium = 2 points, Low = 0 points

Table E 4. Summary of the Kaibab National Forest potential wilderness area availability ratings

Area Name, Size, PWA Number[a]	Availability Rating Criteria[b]						
	Timber, Vegetation, and Fire Mgmt.	Recreation	Wildlife and Plants	Livestock Operations	Lands and Minerals	Heritage and Cultural Resources	Overall Availability[c]
Kanab Creek Additions: 4,710 ac PWA 03-07-034	High (3)	High (3)	High (3)	High (3)	High (3)	High (3)	**High (18)**
Saddle Mountain Addition: 1,296 ac PWA 03-07-043	High (3)	Medium (2)	Medium (2)	High (3)	High (3)	High (3)	**High (16)**
Sycamore Canyon Addition: 988 ac PWA 03-07-057	High (3)	Medium (2)	High (3)	High (3)	High (3)	Medium (2)	**High (16)**
Grassy and Quaking Aspen Canyons: 232 ac, PWA 03-07-099	High (3)	Medium (2)	High (3)	High (3)	High (3)	Medium (2)	**High (16)**
Jacks Canyon: 156 ac PWA 03-07-999	Medium (2)	Medium (2)	High (3)	High (3)	High (3)	Medium (2)	**Medium (15)**
Coconino Rim: 7,750 ac PWA 03-07-079	Medium (2)	Medium (2)	Medium (2)	Medium (2)	Medium (2)	High (3)	**Medium (13)**
Seegmiller: 6,168 ac PWA 03-07-035	Medium (2)	Medium (2)	Medium (2)	Medium (2)	High (3)	Medium (2)	**Medium (13)**
Burro Canyon: 10,735 ac PWA 03-07-003	Medium (2)	Medium (2)	Medium (2)	Low (0)	High (3)	Medium (2)	**Medium (11)**
South Canyon Point: 5,829 ac PWA 03-07-045	Medium (2)	Low (0)	Medium (2)	Medium (2)	High (3)	Medium (2)	**Medium (11)**
Willis Canyon: 6,418 ac PWA 03-07-002	Low (0)	Medium (2)	Low (0)	Low (0)	High (3)	Medium (2)	**Low (7)**

[a] The Kanab Creek, Saddle Mountain, Sycamore Canyon, Jacks Canyon, and Grassy/Quaking Aspen Canyons additions are included based on the "contiguous to existing wilderness" criterion. The remaining five PWAs are included based on the ≥5,000 acres criterion.

[b] Each criterion rating was assigned a numerical score: High = 3 points, Medium = 2 points, Low = 0 points.

[c] Overall availability rating: 16-18 = High (≥87%); 11-15 = Medium (60-86%); <11 = Low (<60%).

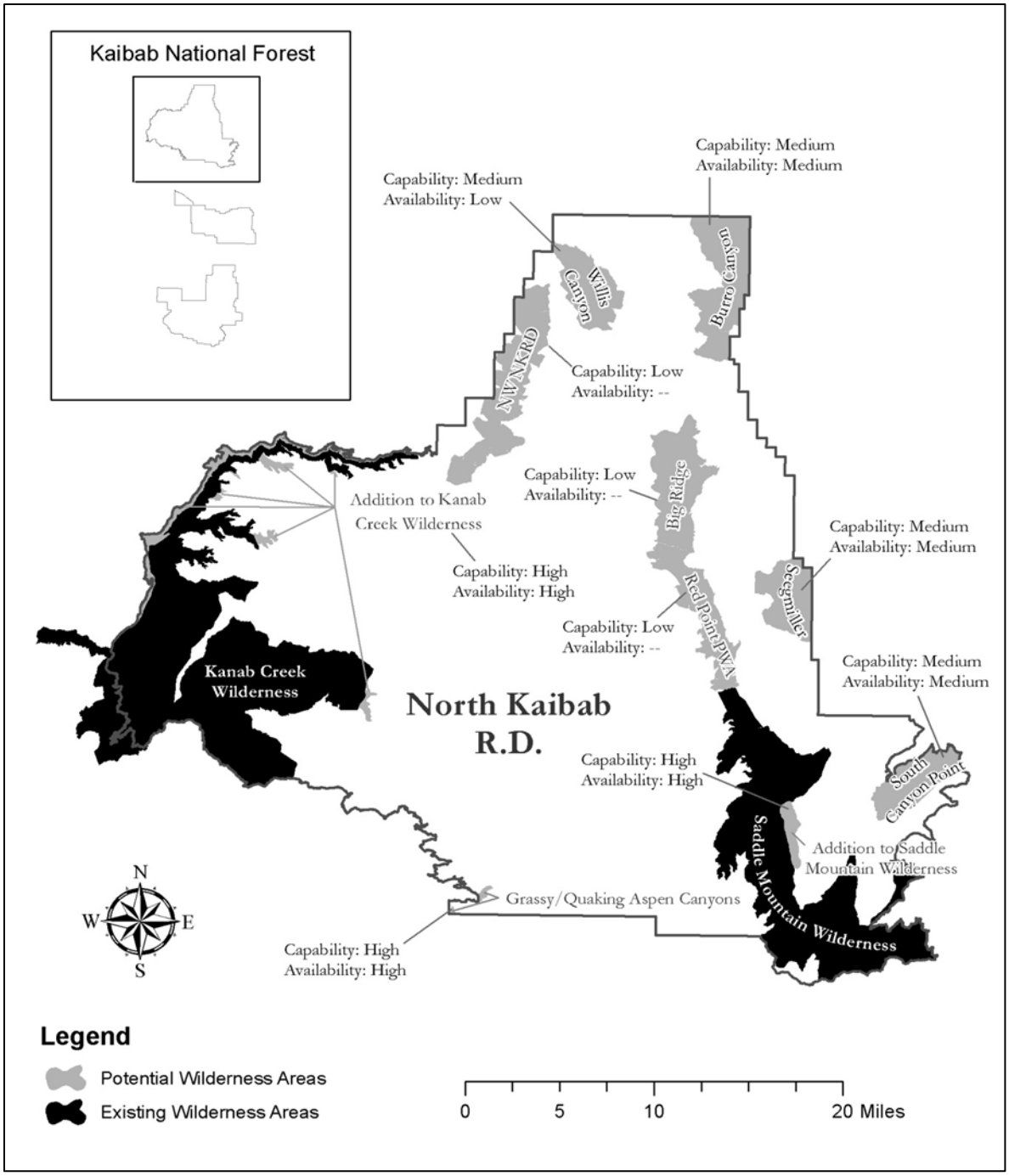

Figure E 1. North Kaibab Ranger District existing and potential wilderness areas with capability and availability

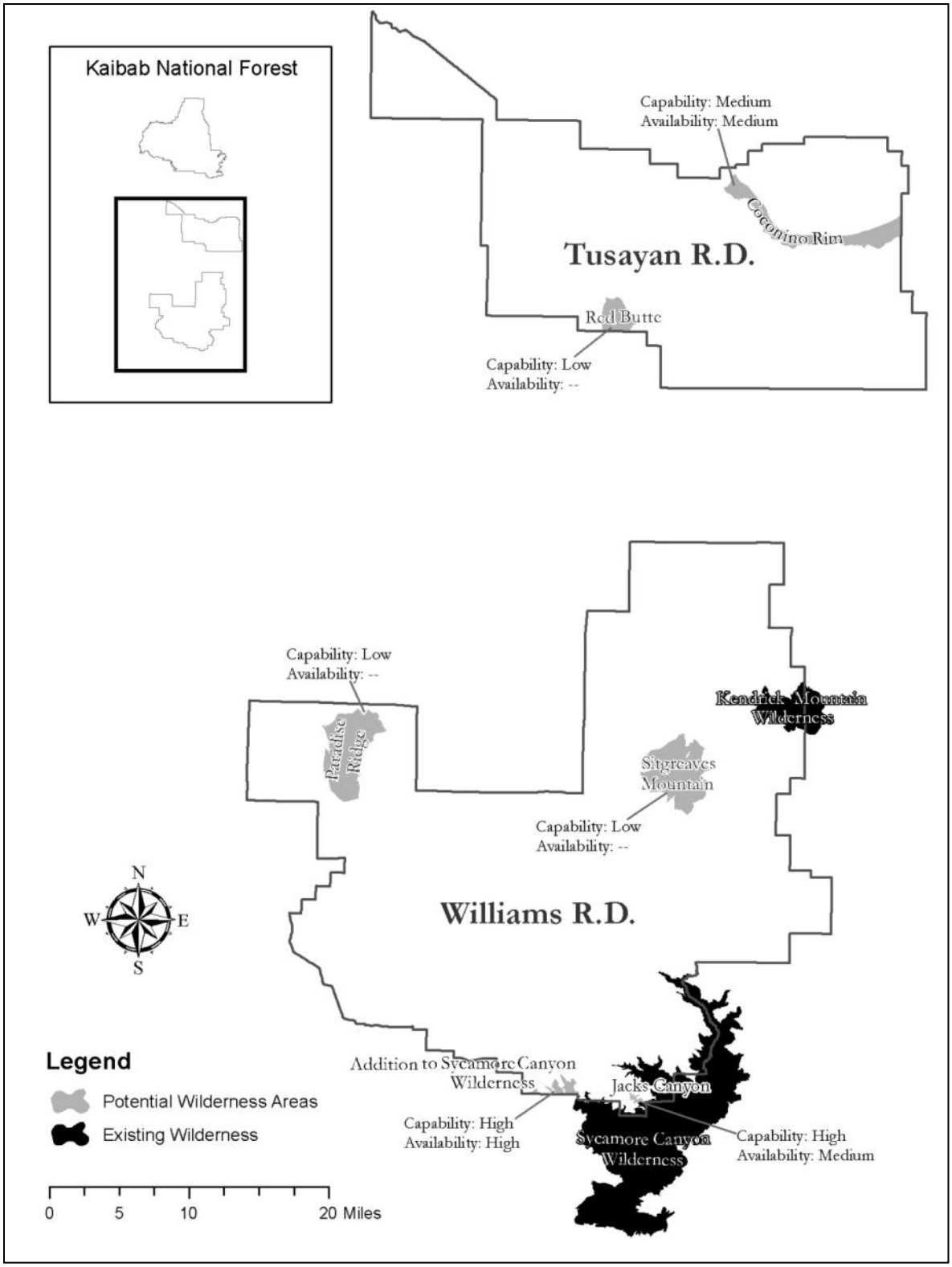

Figure E 2. Tusayan and Williams Ranger Districts existing and potential wilderness areas with capability and availability

Need Analysis

The purpose of the need analysis is to identify the need for additional wilderness based on the regional distribution of wilderness and the representation of landforms and ecosystems within existing wilderness areas. The need for additional wilderness is determined by analyzing the degree to which an individual PWA contributes to the national wilderness system. Need analysis was performed only for the ten PWAs that passed the Capability analysis. The need evaluation is based on six factors and follows the process identified in FSH 1909.12, Subsection 72.3:

1. The location, size, and type of other wildernesses in the general vicinity and their distance from the proposed area. Consider accessibility of areas to population centers and user groups. Public demand for wilderness may increase with proximity to growing population centers.
2. Present visitor pressure on other wildernesses, the trends in use, changing patterns of use, population expansion factors, and trends and changes in transportation.
3. The extent to which non-wilderness lands on the NFS unit or other Federal lands are likely to provide opportunities for unconfined outdoor recreation experiences.
4. The need to provide a refuge for those species that have demonstrated an inability to survive in less than primitive surroundings, or the need for a protected area for other unique scientific values or phenomena.
5. Within social and biological limits, management may increase the capacity of established wildernesses to support human use without unacceptable depreciation of the wilderness resource.
6. An area's ability to provide for preservation of identifiable landform types and ecosystems. Consideration of this factor may include utilization of Edwin A. Hammond's subdivision of landform types and the Bailey-Kuchler ecosystem classification. This approach is helpful from the standpoint of rounding out the National Wilderness Preservation System and may be further subdivided to suit local, subregional, and regional needs.

Table E 5 summarizes the need ratings for the PWAs carried forward from the capability analysis.

Table E 5. PWA need ratings for each factor

Area Name, Size, PWA Number	Need Rating Criteria					
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Kanab Creek Addition: 4,710 ac, PWA 03-07-034	Low	Low	Low	High	Low	Medium
Saddle Mountain Addition: 1,296 ac, PWA 03-07-043	Low	Low	Low	Low	Low	Medium
Sycamore Canyon Addition: 988 ac, PWA 03-07-057	Low	Low	Low	Low	Low	Low
Grassy/Quaking Aspen Canyons: 232 ac, PWA 03-07-099	Low	Low	Low	Low	Low	Medium
Jacks Canyon: 156 ac PWA 03-07-999	Low	Low	Low	Low	Low	Low
Burro Canyon: 10,735 ac, PWA 03-07-003	Low	Low	Low	Low	Low	Medium
Coconino Rim: 7,750 ac, PWA 03-07-079	Medium	Low	Low	Low	Low	Medium
Seegmiller: 6,168 ac, PWA 03-07-035	Low	Low	Low	Low	Low	Low
South Canyon Pt.: 5,829 ac, PWA 03-07-045	Low	Low	Low	Low	Low	Medium
Willis Canyon: 6,418 ac, PWA 03-07-002	Low	Low	Low	Low	Low	Medium

Summary of Results and Leadership Team Discussion

Table E 6 summarizes the capability, availability, and need ratings for the 16 PWAs identified on the Kaibab NF as a part of the plan revision process, and lists the plan alternatives that recommend each area for wilderness designation. Of these, six were not evaluated for availability or need due to low capability ratings. Five PWAs (Kanab Creek Addition, Saddle Mountain Addition, Grassy and Quaking Canyons, Jacks Canyon, and Sycamore Canyon Addition) rated "high" for capability. With the exception of Jacks Canyon, these PWAs rated "high" for availability. All PWAs ranked "low" for need. As a result, considerations were primarily focused on capability and availability, with general recognition of the low need.

The leadership team and plan revision team discussed the individual characteristics of each PWA and the criteria/factors for capability, availability, and need. After considering the merits of each area, there was general support for recommending the areas for wilderness that had at least a combined rating of high/medium capability and availability in the proposed action.

The potential additions to Kanab Creek Wilderness would bring the area managed as wilderness to the rim, making it more identifiable and, therefore, manageable. The potential addition to Saddle Mountain Wilderness would add a unique landform, the "Cockscomb," into the area managed as wilderness. Grassy and Quaking Aspen Canyons are adjacent to proposed wilderness in the Grand Canyon National Park and would also bring the area managed as wilderness to the rim, improving manageability. These additions also received strong support from Grand Canyon

NP. Jacks Canyon extends the boundary of the Sycamore Canyon Wilderness into a side canyon, improving its manageability.

Because the Sycamore Canyon Addition is less than 1,000 acres, it was only to be recommended by the Kaibab NF for wilderness designation if the adjacent PWA on the Prescott NF (Sycamore Canyon Contiguous C) was recommended in the Prescott's revised forest plan. This portion of the Prescott NF was not included in their proposed action, so the Sycamore Canyon Addition is not recommended as a PWA under the Kaibab NF's Alternative B (proposed action).

Table E 6. Capability, availability, and need ratings for Kaibab National Forest potential wilderness areas

PWA Number	Name	Acres	Capability	Availability	Need
03-07-034	Kanab Creek Addition	4,710	High	High	Low
03-07-043	Saddle Mountain Addition	1,296	High	High	Low
03-07-099	Grassy/ Quaking Aspen Canyons	232	High	High	Low
03-07-999	Jacks Canyon	156	High	Medium	Low
03-07-057	Sycamore Canyon Addition	988	High	High	Low
03-07-003	Burro Canyon	10,735	Medium	Medium	Low
03-07-079	Coconino Rim	7,750	Medium	Medium	Low
03-07-035	Seegmiller	6,168	Medium	Medium	Low
03-07-045	South Canyon Point	5,829	Medium	Medium	Low
03-07-002	Willis Canyon	6,418	Medium	Low	Low

Following the discussion of what should be included in the proposed action (Alternative B) to be recommended for wilderness, there was discussion about which PWAs should be evaluated in detail in the alternatives to the proposed action. During the scoping phase for the plan, comments were received on the initial capability and availability evaluations. Some commenters wanted all of the inventoried roadless areas and Sitgreaves Mountain to be recommended for wilderness. Other comments stated that no new areas should be recommended for wilderness, and others supported the recommendation of any capable areas contiguous to the Grand Canyon be proposed as wilderness.

Of the five inventoried roadless areas on the Kaibab NF, Big Ridge and Red Point rated low for capability. This is due in large part to the effects of the Warm Fire of 2006, which burned these areas at generally high severity. These areas were considered but not included in the alternatives to be analyzed in detail because of their lower capability and because they would benefit from management aimed at improving their ecosystem integrity. Such management would be more efficient and effective with the ability to use a variety of tools, including mechanized and motorized equipment, and would likely improve these areas' wilderness capability over the long term. Similarly, Sitgreaves Mountain was eliminated from further consideration because of a low capability rating and the need for treatments aimed at reducing the risk of uncharacteristic fire. Not recommending these or other areas for wilderness designation at this time does not preclude their recommendation in the future. All of the remaining PWAs that received at least a medium

capability rating were included in the alternatives to the proposed action in an effort to maintain a range of alternatives and provide the greatest amount of information for use in the decision.

Overview of Results

The proposed action recommends four PWAs (Kanab Creek Addition, Saddle Mountain Addition, Grassy/Quaking Aspen Canyons, and Jacks Canyon), totaling about 6,394 acres, for wilderness designation. These areas are shaded grey in Table E 6.These areas would be managed under the "Recommended Wilderness Management Area" in the proposed plan. Alternatives C and D recommend the PWAs in the proposed action, plus six additional wilderness areas (totaling about 37,000 acres): Burro Canyon, Coconino Rim, Seegmiller, South Canyon Point, Sycamore Canyon addition, and Willis Canyon.

References

USDA Forest Service, Kaibab National Forest (KNF). 2013. Kaibab National Forest Potential Wilderness Area Evaluation Report. Williams, AZ: Kaibab National Forest.

Appendix F. Wild and Scenic River Assessment

Introduction

The Wild and Scenic Rivers Act of 1968 (Public Law 90-542),Section 1(b), expresses congressional policy for America's rivers as follows:

> *"It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their environments, possess outstanding remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations."*

To accomplish this decree, Congress established a National Wild and Scenic Rivers System and prescribed methods and standards by which selected rivers could be added. Rivers or river segments are eligible to be considered for inclusion in the National Wild and Scenic Rivers System if they are essentially free flowing (without major dams, diversions, or channel modifications) and if they possess at least one "outstandingly remarkable" scenic, recreational, geologic, fish, wildlife, historic, cultural, or other similar value. These values should be a unique or exceptional representation for the area studied, and must be related to the river or its immediate environment. For study purposes, the Act requires that the evaluation of a river's eligibility consider, as a minimum, the area within ¼ mile of either side of the high water mark of the river.

Eligible rivers are evaluated for potential classification and determination of suitability. They s are considered for potential "wild," "scenic," or "recreational" classification based on the condition of the river and adjacent lands as they exist at the time of the study. The suitability analysis provides the basis for determining which rivers to recommend as components of the National Wild and Scenic Rivers System and considers the appropriateness of congressional designation and classification as a wild, scenic or recreational river. Suitable rivers may be recommended to Congress by the administration, whereby Congress then decides whether to pass a law adding the river to the national system. If designation occurs, a final boundary is established and a comprehensive river management plan is developed.

The Wild and Scenic Rivers Act also provides specific direction in Section 5(d)(1) regarding the identification of potential wild and scenic rivers in Federal agency planning processes:

> *"In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic, and recreational river areas, and all river basin and project plan reports submitted to the Congress shall consider and discuss any such potentials."*

Land Management Planning

The land management planning process shall include a comprehensive evaluation of the potential for rivers in an administrative unit to be eligible for inclusion in the national system. Sources for identifying the significance of river-related values include the Nationwide Rivers Inventory; state

river assessments; identification by tribal governments, or other Federal, State, or local agencies; and the public.

Agency policy related to wild and scenic rivers assessment during the land management planning process is defined in the Land Management Planning Handbook (FSH 1909.12, Chapter 80, Wild and Scenic River Evaluation). This chapter describes the process for identifying and evaluating potential additions to the National Wild and Scenic Rivers System on National Forest System lands pursuant to the Wild and Scenic Rivers Act. It requires the land management planning process to include a comprehensive evaluation of the potential for rivers to be eligible for inclusion in the national system.

Direction is provided in FSH 1909.12, Section 81.2 in regard to the assessment of rivers in forest plan revision. The assessment of a river identified as having potential for wild and scenic river designation follows a 3-step process:

7. Determination of eligibility.
8. Potential classification (wild, scenic, or recreational).
9. Determination of suitability.

Latitude is provided in FSH 1909.12, Chapter 80 regarding the process used for determination of eligibility as well as determination of suitability in land management planning, i.e., *completing a river study in the revised forest plan* to determine which rivers the agency may recommend to Congress as additions to the National Wild and Scenic Rivers System. Specifically, FSH 1909.12, Section 81.2 states:

> *"If a systematic inventory of eligible rivers or a comprehensive forest, grassland, prairie, or other comparable administrative unitwide suitability study has been previously completed and documented,* ***additional assessment and study at time of land management plan revision need only be done if changed circumstances warrant additional review of eligibility*** *or if the responsible official decides to evaluate suitability for one or more eligible rivers in the planning process. Otherwise, the process need not be revisited in land management planning."*

Determination of Eligibility and Potential Classification

Wild and scenic rivers were not addressed in the 1987 forest plan for the Kaibab NF. However, a systematic inventory of eligible rivers was completed in January 1993 by the Forest Service, the Arizona Game and Fish Department, and other state and Federal agencies. The 1993 report, known as the Preliminary Analysis of Eligibility and Classification for Wild/Scenic/Recreational River Designation, included representatives from the Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott and Tonto National Forests. Resource information for potential wild, scenic, and recreational rivers that the Forest Service determined to be potentially eligible for inclusion into the National Wild and Scenic Rivers System was compiled in a supplemental report published in September 1993 [Resource Information Report – Potential Wild/Scenic/Recreational River Designation, National Forests of Arizona (USDA Forest Service 1993)]. This report includes a determination of eligibility for Kanab Creek, with a classification of wild. Detailed information in the report includes location, descriptions of resources, outstandingly remarkable values, land uses and developments and social and economic values. In accord with FSH 1909.12, Section 81.2,

this inventory has been used as the basis for assessing potential wild and scenic rivers eligibility in the revision of the Kaibab National Forest Land and Resource Management Plan.

As a result of the 1993 inventory, Kanab Creek was listed as eligible in the Nationwide Rivers Inventory. This Inventory, first published by the National Park Service in 1982, is a listing of more than 3,400 free-flowing river segments in the United States that are believed to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance. Under a 1979 presidential directive and related Council on Environmental Quality procedures, all Federal agencies must seek to avoid or mitigate actions that would adversely affect one or more Nationwide Rivers Inventory segments. The Nationwide Rivers Inventory includes 20 miles of Kanab Creek, located on the Kaibab NF and within a designated wilderness (see table F 1). Additional segments of Kanab Creek beyond the southern Kaibab NF boundary are eligible. This segment includes the reach which flows into the Colorado River through lands administered by the National Park Service in Grand Canyon National Park.

Table F 1. Description of the eligible segment located on the Kaibab National Forest

River	County	Reach	Length (miles)	Year Listed	Potential Classification	ORVs	Description
Kanab Creek	Mohave-Coconino Boundary	FS/BLM Boundary to NPS/FS Boundary	20	1993	Wild	S, R, W, G	Intermittent, isolated reaches of perennial flow. Riparian vegetation. Broad canyon.

Source: Nationwide Rivers Inventory at *http://www.nps.gov/ncrc/programs/rtca/nri/states/az2.html*

ORV = Outstandingly remarkable value (S-Scenery, R-Recreation, W-Wildlife, G-Geology)

As allowed in FSH 1909.12, Section 81.2, this forest plan revision includes supplementary assessment of the 1993 inventory in order to determine if there are additional rivers or river segments that may be eligible given changed circumstances and/or new information that has occurred since the 1993 inventory was completed. The supplementary assessment entails a review of the following information as it relates to changed circumstances:

1. Changes in land status or ownership. The acquisition of additional private lands on the Kaibab NF could include new rivers or river segments that may not have been addressed in the 1993 inventory.
2. Changes related to additional identification of important resource values that may not have been identified in the 1993 inventory. New information regarding identification of important resource values could be reflected in monitoring and evaluation reports conducted on the Kaibab NF since the 1993 inventory.

As a result of the supplementary assessment, there are no changed circumstances or conditions necessitating additional consideration of rivers. Kanab Creek will continue to be listed in Nationwide Rivers Inventory as eligible for further study.

Determination of Suitability

The Kaibab NF has chosen to delay the suitability determination on Kanab Creek until a separate study is conducted outside of the forest plan revision process.. As provided in FSH 1909.12, Section 83.1, the decision to delay the suitability determination must be accompanied by provisions to provide for protection of the river area until a decision is made as to the future use of the river.

For interim management of eligible or suitable rivers, the special area recommendation should include the desired conditions, objectives, guidelines, and suitability of areas to be used in the design of projects and activities consistent with management guidelines of eligible or suitable rivers (FSH 1909.12, section 82.51). The segment determined as eligible for Kanab Creek is contained within a designated wilderness. The desired conditions, objectives, guidelines, and suitability of areas to be used in the design of projects and activities contained within the wilderness management area direction are consistent with management guidelines that protect Kanab Creek's eligibility and potential wild classification, therefore no additional direction is needed in the revised plan.

Summary of Results

The eligibility process resulted in finding no new rivers or river segments eligible for inclusion in the National Wild and Scenic Rivers System. Kanab Creek is considered eligible for further study as a wild and scenic river. Interim management of Kanab Creek within a designated wilderness will maintain its eligibility as a classified wild river until a suitability study is completed.

References

USDA Forest Service. 1993. Resource information report: Potential wild/scenic/recreational river designation, national forests of Arizona. Albuquerque, NM: Southwestern Region, USDA Forest Service.

Appendix G. Research Natural Area Evaluation

Background

Research natural areas (RNAs) are a type of special area within the National Forest System designated for their unique or special characteristics (FSM 1905 – Definitions). As special areas, RNAs must be supported by desired conditions or other plan components developed in the revised forest plan. RNAs are physical or biological units in which current natural conditions are maintained insofar as possible. These conditions are ordinarily achieved by allowing natural physical and biological processes to prevail without human intervention. RNAs are principally used for nonmanipulative research, observation, and study (FSM 4063). RNAs are designated to:

> *"maintain a wide spectrum of high quality representative areas that represent the major forms of variability found in forest, shrubland, grassland, alpine, and natural situations that have scientific interest and importance that, in combination, form a national network of ecological areas for research, education, and maintenance of biological diversity" (FSM 4063.02).*

Guidance for the selection and establishment of RNAs within the National Forest System comes primarily from the manuals for land and resource management planning and associated environmental analyses (FSM 1920 and FSM 1950). RNAs must be large enough to provide essentially unmodified conditions within their interiors. Whenever possible, proposed areas should show no evidence of major disturbances by humans, such as livestock grazing or timber cutting, for the past 50 years. In the selection of representative areas, a pristine condition is the goal.

Regional Research Natural Area Inventory

The Southwestern Region developed a process for the evaluation and incorporation of RNAs into forest plan revision under the 1982 Planning Rule Provisions (USDA Forest Service 2009). A Regionwide coarse-filter assessment of RNA ecological representation was conducted to help identify ecosystems and vegetation types that are underrepresented among the Region's currently established RNAs. This provided an inventory of existing and previously proposed RNAs as identified in existing forest plans. The inventory identified 18 designated or formally established RNAs in the Southwestern Region, and 28 RNAs that were previously proposed (recommended) but never formally established.

To assist the coarse filter analysis of RNA representativeness in the region, the RNAs were categorized by potential natural vegetation type (PNVT). Four ecological datasets were used to help determine how well the established and previously proposed RNAs represent vegetation types and ecosystems in the Southwest, including:

- R3 Climate Regime
- The Nature Conservancy (AZ) Priority Conservation Areas
- Ecoregions (Cleland et al. 2007)
- R3 Potential Natural Vegetation (PNVT)

Regional Research Natural Area Representativeness Needs Assessment

Once the regional RNA inventory was completed, it was used to evaluate the need for additional RNAs in the region. This process rated the representativeness of existing RNAs within the region and identified underrepresented ecosystems. The objective of this effort was to support an effective ecological distribution of RNAs across major climate gradients, biophysical settings (PNVTs), and to some extent, across important vegetation types within life zones.

The distribution of existing RNAs and other protected lands, inside and outside the agency, were compared with the distribution of PNVT classes (general ecosystem types), ecological sections, and terrestrial ecological unit inventory (TEUI) climate gradients (Winthers et al. 2005). This assessment was conducted under the assumption that any proposed RNAs would be designated for the purposes of research and establishing reference sites across all major ecosystem types.

RNA needs were considered according to the distribution of currently-protected lands across PNVT classes, ecological sections, and TEUI climate gradients. There currently are 18 designated (formally established) RNAs in the Southwestern Region. The RNA Needs Assessment assigned representativeness ratings on a scale of 1 to 3. A rating of “1” reflects the least degree of need according to those criteria of representativeness used for this assessment (PNVT is well represented). A rating of “2” indicates that the PNVT is moderately represented, but additional representation across the region may be warranted. A rating of “3” reflects there is very little to no representation of a particular PNVT. In this assessment, rating of 2 and 3 are considered appropriate for RNA recommendations. Table G 1 displays the need ratings for the PNVTs that occur on the Kaibab National Forest (NF).

Table G 1. Potential natural vegetation type (PNVT) on the Kaibab National Forest and their research natural area (RNA) needs rating for the Southwestern Region

PNVT Name	Need for Additional RNA
Juniper Grassland	3
PJ Sagebrush	1
PJ Woodland (persistent)	2
Ponderosa Pine Forest	2
Mixed Conifer - Frequent Fire	1
Spruce-fir Forest	1
Sagebrush Shrubland	2
Montane/Subalpine Grassland	1
Colorado Plateau/Great Basin Grassland	1
Semidesert Grassland	2
Desert Communities	1
Gambel Oak Shrubland	2
Wetland/Cienega	2
Cottonwood Willow Riparian Forest	2

Kaibab National Forest Evaluation for Previously Proposed Research Natural Areas

The original Kaibab forest plan (as amended) proposed Garland Prairie, a 340-acre area on the Williams Ranger District, as an RNA. This area is typical of the high-elevation grassland ecotone dominated by Arizona fescue and mountain muhly and is classified as the montane grassland PNVT. Garland Prairie was never established as a RNA, so it was reevaluated as a candidate for establishment under the revised plan. The first step in the evaluation process is to identify whether the potential RNA contains PNVTs with a need rating of 2 or 3, and if there are outstanding aquatic habitats within the area. Because this area has a need rating of "1" and there are no associated aquatic habitats, Garland Prairie does not meet the regional RNA PNVT representativeness criteria and is not being recommended for establishment.

Garland Prairie (Montane Grassland PNVT, Need Ranking = 1)

While Garland Prairie does not meet the need criteria for RNA designation, the Kaibab NF recognizes it has continued value as a reference area because grazing has been excluded since 1989, and it was considered to be in good condition when it was identified in the original forest plan. The area has some invasive species present and also conifer encroachment that would benefit from treatments. As a result, the proposed forest plan has retained Garland Prairie as a management area and provided plan direction that would protect it from activities that could directly or indirectly modify ecologic processes.

Identification and Evaluation of New Research Natural Areas on the Kaibab National Forest

The Kaibab NF solicited public input during several phases of the plan revision process: at the initial public meetings, during a topic meeting on special areas, as a question in the initial working drafts of the proposed plan, and during the Issues and Alternatives Development meeting. At the public meetings held in Williams and Fredonia, Arizona, in August 2009, an RNA poster was presented that shared the RNA concept and assessment process. During the meeting, there were opportunities to provide oral or written responses to several questions, including one specifically for RNAs:

> "Are there specific areas that you know of on the forest that might be good examples of the underrepresented vegetation types to consider for designation as RNAs? (i.e., ponderosa pine, Gambel oak, pinyon-juniper, sagebrush, semidesert grassland, wetlands, cottonwood/willow riparian forest)?"

There were no written or oral responses to this question at either meeting.

Additionally, the forest solicited input from forest specialists and partners. One area, Lookout Canyon, was identified internally by a gap in the forest timber sale data. This suggested that the area had not been commercially logged. This was shared as a potential RNA that would be evaluated, and it received support from participants during the issues and alternative development meeting in July 2010.

No juniper grasslands (need = 3) were brought forward as potentially good RNAs. Historically pinyon-juniper grasslands had relatively low tree cover and typically experienced low-severity fires. Disruptions in the fire regime on the Kaibab NF have resulted in the pinyon-juniper grasslands being denser than the reference conditions and with an increased risk of stand-replacing fire. The juniper grasslands on the forest are generally departed from reference conditions and regular livestock grazing occurs in most of the PNVT (KNF 2008).

Lookout Canyon (Ponderosa Pine PNVT, Need Ranking = 2)

Lookout Canyon is located on the North Kaibab Ranger District. This potential RNA area is a relatively steep, narrow canyon that runs from southeast to northwest on the northeast side of NFS Road 22 between NFS Roads 415 and 425. Elevation varies from approximately 8,000 feet to 7,600 feet over one-quarter to one-third of a mile.

A field trip to the area revealed that the northeast-facing slope is primarily mixed conifer. The bottom of the canyon is a grassy opening approximately 50 to 100 meters wide. The southwest-facing slope is occupied by dense, single-story ponderosa pine, and does not appear to represent the reference condition. Because the northeast-facing slope would be better described as frequent fire mixed conifer PNVT (which has a need rating = 1), this potential RNA has a lower need.

Summary of Results

The Kaibab NF followed the evaluation process and completed the ecological conditions review table (see table G 2) for Lookout Canyon. The field trip and documentation revealed that the area was a poor representation of the ponderosa pine PNVT. Because no new areas were identified as potentially good RNAs and the only previously recommended RNA (Garland Prairie) no longer meets the criteria, no RNAs are being recommended during this plan revision effort.

Table G 2. Review of ecological conditions in Lookout Canyon

Ecological Conditions Appropriate for RNA Establishment	State Reason Why the Area Meets the Criterion	State Reason Why the Area Does Not Meet the Criterion
Area contributes to a wide spectrum of high-quality representative areas that represent the major forms of variability found in forest, shrubland, grassland, alpine, aquatic habitats, and natural situations of scientific interest and importance that in combination form a national network of ecological areas for research, education, and maintenance of biological diversity. RNA represents a specific vegetation type or ecosystem as identified by the regional ecological RNA evaluation.		Mixed conifer w/aspen is ranked "1" – least need. No aquatic habitats. Does not represent a specific vegetation type.
Area contributes or continues to contribute to the preservation and maintenance of genetic diversity, including threatened, endangered, aquatic systems, and sensitive species.	May contain sensitive bat species.	No known threatened, endangered, or sensitive species.
Area serves as a baseline or reference area for the study of long-term ecological processes such as disturbance, hydrologic processes, climate change, or other processes.		Definitely NOT a reference area. Seeded nonnative grass species, ponderosa pine multistoried and denser than reference conditions.
Area serves as a control area for comparing results from manipulative research.		Steep slopes would likely prevent manipulative research.
Area boundaries encompass an area large enough to provide essentially unmodified conditions within their interiors, and to protect the ecological processes, features, and/or qualities for which the RNA was established.		Narrow, highly modified, subject to human presence and disturbance.
Area shows little or no evidence of major disturbances by humans. Activities, such as livestock grazing and other uses, have not affected the area beyond its ability to recover. No evidence of timber cutting in past 50 years.		Developed trail and trailhead nearby, stumps, two-track road up the bottom of the canyon with, recent vehicle use evident, power line, livestock evidence.
Area reflects its original, near pristine condition *as closely as possible*.		Not Pristine
The best available, qualified area was chosen. In certain geographic regions and in certain community types, it may be impossible to find candidate areas that do not contain exotic plant or animal life.		NO

References

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Appendix H. Crosswalk Between Species Habitat Risk/Threats and Plan Components

This table is a crosswalk that shows how plan components meet species specific habitat needs. More detailed information on individual species contained within groups can be found in the "Species Diversity Report," version 1.2.5.

DC = Desired Conditions, OBJ = Objectives, ST = Standards, GD = Guidelines

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
Tree dependent Northern goshawk, golden eagle, juniper titmouse, ferruginous hawk, red-faced warbler, evening grosbeak, olive-sided flycatcher, dusky grouse, Grace's warbler, black-throated gray warbler, bald eagle, Lewis's woodpecker, purple martin, red-naped sapsucker, Mexican spotted owl, gray vireo, western skink, Utah Mountain kingsnake, pale Townsend's big-eared bat, Allen's lappet-browed bat, southwestern myotis , Merriam's shrew	Large trees and snags, cavities, downed logs, woody debris, mistletoe broom	Logging, wildfire, forest treatments such as prescribed fire and thinning, firewood collection, pile burning.	**Pinyon-Juniper Communities DC:** Pinyon-juniper communities occur as a shifting mosaic across the landscape interspersed with openings. Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and burls. Snags, green snags and downed trees greater than 10 inches at root collar are present and average 1 to 2 per acre. **Pinyon-Juniper Shrub Communities DC:** The pinyon-juniper sagebrush shrub forest type is a mix of trees and shrubs that occur as shifting vegetation states (herbaceous-dominated, shrub-dominated, and tree-dominated) in even-aged and uneven-aged patches with a variable understory. There is a mix of large and small to mid-size juniper. **Pinyon-Juniper Woodland DC:** Some very old trees (over 300 years old) are present. Disturbances rarely affect the composition, structure, and function. Insects, disease and mistletoe occur at endemic levels. **Pinyon-Juniper Communities GD:** Restoration efforts should emphasize the retention of groups of mature trees where they occurred historically. Where pinyon-juniper obligate species occur (e.g., gray vireo), project designs should use methods (e.g., selective pruning, lop and drop, etc.) that emphasize the retention of key habitat features including snags, and partially dead or dying trees, and downed logs. **Ponderosa Pine DC:** *Fine-scale:* Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Large tree form oaks, snags and partial snags with hollow boles or limbs are present. Isolated infestations of Southwest dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees. Witch's brooms may form

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			on infected trees, providing habitat and food for wildlife and invertebrate species. *Mid-scale:* The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with larger trees (i.e. >18 inches d.b.h.) contributing the greatest percent of the total basal area. Snags 18inches d.b.h. or greater average 1 to 2 snags per acre. Snags and green snags of various size and forms are common. Downed logs (over 12 inches diameter at mid-point, and greater than 8 feet long) average 3 logs per acre. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. *Landscape:* The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Groups of old trees are mixed with groups of younger trees. The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present. Snags, green snags, and coarse woody debris are well-distributed throughout the landscape. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g., fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind). **Frequent Fire Mixed Conifer DC:** *Fine-scale:* Trees within groups are of similar or variable ages, often containing more than one species. Dwarf mistletoe infections may be present on ponderosa pine and Douglas-fir, and rarely on other tree species, but the degree of infection severity and rate of mortality varies among infected trees. Witch's brooms may be present with these infestations, providing habitat for wildlife. *Mid-scale:* The frequent fire mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. Basal area within forested areas generally ranges from 30 to100 square feet per acre, with larger trees contributing the greatest percent of the total basal area. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Snags and green snags, 18inches d.b.h. or greater average 3 per acre. Downed logs (greater than12 inches diameter at mid-point and over 8 feet long) average 3 per acre within the forested area of the mid-scale. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. *Landscape:* At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees are present and snags, top killed, lightning and fire scarred trees, and coarse woody debris (greater than 3-inch diameter) are well-distributed throughout the landscape. The landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g., fire, insects, diseases, and wind). Dwarf-mistletoe is present and infects ponderosa pine and Douglas-fir, but occurs at endemics levels, which allows for the establishment and sustainability of the desired uneven aged forest structure over time. **Mesic Mixed Conifer/Spruce-Fir DC:** *Fine-scale:* Trees within groups can be of similar or variable species and ages. Dwarf mistletoe infections may be present on Douglas-fir or spruce and rarely on other tree species, but the degree of infection severity and amount of mortality varies among infected trees. Witch's brooms may be present with these infestations, providing habitat for wildlife. *Mid-scale:* The number of snags and downed logs (greater than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (over 3-inch diameter) vary by seral stage. Snags 18 inches or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, varies by seral stage, but ranges from 5 to 20 tons per acre for early seral, 20 to 40 tons per acre for mid seral, and over 35 tons per acre in late seral areas. Fire and other disturbances maintain overall desired tree density, structure, species composition, coarse woody debris, and nutrient cycling. *Landscape:* The vegetation community is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape is composed predominantly of vigorous trees, but older declining trees are a component and provide for snags, top-killed, lightning- and fire-scarred trees, and coarse woody debris. The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees. Dwarf mistletoe infestations may be present in stands that are composed of Douglas-fir or spruce and rarely in other tree species. Infestation size, degree of severity, and amount of mortality varies among infested stands. Witch's brooms may be scattered throughout the infestations providing structural diversity in the stand and improved foraging and nesting habitat for wildlife species such as small mammals (e.g., tree squirrels), and raptors (e.g., goshawks, spotted owls). Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris) and structural

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			diversity. **Aspen (General) DC:** Aspen is successfully regenerating and recruiting into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smallest classes. **Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forests DC:** In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference condition. **Aspen within Mesic Mixed Conifer / Spruce-Fir Forests DC:** Downed aspen and woody debris are scattered across the landscape and provide habitat for a variety of wildlife species (e.g., small mammals, reptiles, amphibians, and birds) while contributing to efficient nutrient cycling. The size, age, and spatial extent of aspen stands reflect large-scale disturbance patterns and processes. **Aspen GD**: Aspen trees 10 inches or greater d.b.h. (both live and dead) should be protected during project activities, except where they may pose a risk to fences lines or regeneration efforts. **Vegetation Management in all Forested Communities GD:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design and treatment prescriptions should generally not remove: (1) Large, old ponderosa pine trees with reddish yellow wide platy bark, flattened tops, with moderate to full crowns and large drooping or knarled limbs (e.g., Thompson's age class 4, Dunning's tree class 5 and/or Keen's tree class 4, A and B). (2) Mature trees with large mistletoe brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time. (3) Large snags, partial snags and trees (greater than 18 inches d.b.h) with broken tops, cavities, sloughing bark, lightning scars over 4 inches wide, and large stick nests (over 18 inches in diameter). (4) Gambel oak greater than 8 inches d.r.c. and (5) Known bat roost trees. **Activities Following Large-scale Disturbances GD:** Recovery and restoration project design should seek to establish a trajectory toward the desired conditions for the affected vegetation type. Some snags and coarse woody debris should be retained to provide for wildlife habitat, soil stabilization, and other resource benefits. Some clumps of large (18 inches d.b.h.) standing dead trees should be retained. Snag retention should be balanced with desired fuel levels over time. **Cottonwood Willow Riparian DC:** Snag and gallery tree components comprised 55 percent

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			mid-aged to mature cottonwood and willow trees, 25 percent younger trees, and 20 percent in grass, shrubs, suckers, seedlings, and tree sprouts. Mature cottonwood and other trees provide cavities for cavity-dependent wildlife such as woodpeckers, sapsuckers and secondary cavity users. Tall trees provide lookouts and opportunities for nesting raptors. **Wildlife DC:** Species with specific habitat needs such as snags, logs, large trees, interlocking canopy, and cavities are provided for. **GD:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. Project activities and special uses should incorporate recommended measures for golden eagle management such as closures to limit human disturbance in the vicinity of golden eagle nests. **Threatened, Endangered, and Sensitive Species GD:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Personal Fuelwood Collection GD:** The following should be permitted for personal use fuelwood gathering: (1) Dead and downed ponderosa pine, Douglas-fir and spruce, juniper, pinyon pine, Gambel oak, or aspen. (2) Standing dead: (a) Ponderosa pine, Douglas-fir or spruce less than 12 inches d.b.h. or less than 15 feet in total height; (b) Juniper without green foliage; (c) Pinyon pine less than 12 inches d.r.c. or less than 12 feet in height; (d) Gambel oak: less than 8 inches d.r.c.; and (e) Aspen, less than 12 inches d.b.h. **Wildland Fire Management GD:** Decision documents for wildland fires should address wildlife desired conditions for key habitat features that provide structural diversity such as snags, logs, large tree form oaks, and oak thickets. Associated courses of action or management practices to address those objectives should also be developed. **Wildland-urban Interface DC:** Logs and snags, which often pose fire control problems, are present in the wildland-urban interface, but at the lower end of the range given in the vegetation community desired conditions. Dead and down fuel load is between 1 and 5 tons per acre.
Multilayered canopy, interlocking canopy and old growth Northern goshawk, juniper titmouse, red-faced warbler, evening	Interlocking canopy, old growth and denser stands.	Logging, fire (natural and prescribed).	**Pinyon Juniper Communities DC:** Pinyon-juniper communities occur as a shifting mosaic across the landscape interspersed with openings. Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). At the mid-scale and above, canopy cover is at least 10 percent with a mix of young and mature groups and clumps of trees. The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and

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grosbeak, olive-sided flycatcher, dusky grouse, black-throated gray warbler, pinyon jay, Lewis's woodpecker, MacGillivray's warbler, green-tailed towhee, golden-crowned kinglet, Mexican spotted owl, Arizona treefrog, Abert's squirrel, Kaibab tree squirrel, dwarf shrew, red squirrel			burls. Some tree groups have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging. **Pinyon-Juniper Shrub Communities DC:** The pinyon-juniper sagebrush shrub forest type is a mix of trees and shrubs that occur as shifting vegetation states (herbaceous-dominated, shrub-dominated, and tree-dominated) in even-aged and uneven-aged patches with a variable understory. **Pinyon-Juniper Communities GD:** Restoration efforts should emphasize the retention of groups of mature trees where they occurred historically. **Ponderosa Pine DC**: *Fine-scale:* Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group. Where Gambel oak comprises more than 10 percent of the basal area, it is not uncommon for canopy cover to be greater than 40 percent. *Mid-scale:* The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north facing slopes). *Landscape:* The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Frequent Fire Mixed Conifer DC:** *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Tree groups are typically greater than 1-acre size and consist of 2 to 50 trees per group, but are sometimes larger, such as on north-facing slopes. Density is variable, with canopy ranging from very open to very closed. *Mid-scale:* The more biologically productive sites contain more trees per group and more groups per area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree group than in the general forest; these include goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, and north-facing slopes. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural

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			stages. *Landscape:* At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Forest appearance is variable but generally uneven-aged and open; occasional patches of even-aged structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass/forb/shrub vegetation associations similar to reference conditions. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist in some locations such as north facing slopes, canyons, and drainage bottoms. **Mesic Mixed Conifer/Spruce-Fir DC:** *Fine-scale:* Mid-aged and older forests trees are typically variably-spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. *Mid-scale:* Forest conditions in some areas contain higher basal area than the general forest; examples include goshawk post-fledgling family areas, Mexican spotted owl nesting/roosting habitat, and north-facing slopes. Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches. *Landscape:* The vegetation community type is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions. Old growth generally occurs over large areas as stands or forests where old growth is concentrated. Old growth includes old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Aspen (General) DC:** Aspen is successfully regenerating and recruiting into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smallest classes. **Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forests DC:** In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference condition. **Vegetation Management in All Forested Communities GD:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. On suitable

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			timberlands, projects should retain somewhat higher frequencies of trees across broad diameter classes to allow for future tree harvest. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. **Wildlife DC:** Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. **Threatened, Endangered, and Sensitive Species DC:** Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest. **GD:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service sensitive species. A minimum of six nest areas (known and replacement) should be located per territory. Goshawk nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size. Goshawk territories (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest areas.
Understory dependent Dusky grouse, red-faced warbler, Nevada point-head grasshopper, Persephone's darner, desert green hairstreak, Kaibab Indra swallowtail, four-spotted skippering, Nokomis fritillary, Nokomis fritillary ssp. nokomis, pronghorn, Navajo Mogollon vole, Merriam's shrew, dwarf shrew	Native grasses and shrubs/ underbrush.	Pile burning, nonnative plant invasion.	**Pinyon-Juniper Communities DC:** Pinyon-juniper communities occur as a shifting mosaic across the landscape interspersed with openings. At the mid-scale and above, canopy cover is at least 10 percent with a mix of young and mature groups and clumps of trees. Plant litter (leaves, needles, etc.) and understory plant cover is present in sufficient quantity to stabilize soils, prevent erosion, promotes nutrient cycling, improve water retention, and provide the microclimate conditions necessary for pinyon seed germination. **Pinyon-Juniper Grasslands DC:** Pinyon-juniper grasslands are generally uneven-aged and open in appearance. Trees occur as individuals, but occasionally are in small groups and range from young to old. Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to maintain soil productivity, resist soil erosion and can support frequent low-intensity surface fires. Understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type and vegetation potential, bare soil varies between 10 and 60 percent. Basal vegetation varies between 5 and 50 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. The relative proportion of vegetation canopy cover averages 40 to 60 percent grass, 10 to 30 percent forbs, and 5 to 20 percent shrub.. **Pinyon-Juniper Shrub DC:** The shrub component consists primarily of sagebrush, but oak,

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			cliffrose, and other shrub species may also be present. The understory is dominated by shrubs depending on structural stage. The shrub component consists of one or more shrub species, which are well-distributed. Litter and rock comprise the greatest percentage of ground cover. Grasses and forbs are sparse due to shrub dominance. **Pinyon-Juniper Communities GD:** Pinyon-juniper communities should maintain tree densities that maximize herbaceous plant growth and wildlife species diversity typical for their respective community subtype. Project design for vegetation management activities should prioritize treatment areas along known wildlife corridors, in the wildland-urban interface, and historic openings. **Ponderosa Pine DC** *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. The interspaces between groups are variably shaped, composed of a grass/forb/shrub mix, and may contain individual trees or snags. Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function. Herbaceous vegetation reflects the site potential. *Mid-scale:* Basal area within forested areas generally ranges from 20 to 80 square feet per acre, with larger trees (i.e. >18 inches d.b.h.) contributing the greatest percent of the total basal area. Interspaces with grass/forb/shrub vegetation are variably shaped and typically range from 10 to 70 percent, with the more open conditions typically occurring on less productive sites. *Landscape:* The forest is generally uneven-aged and open. **OBJ:** Mechanically thin 11,000 to 19,000 acres annually. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. **Frequent Fire Mixed Conifer DC:** *Fine-scale:* Trees typically occur in irregularly shaped groups and are variably-spaced with some tight clumps. Interspaces between groups are variably shaped, are comprised of native grasses-forbs- shrubs mix, and may contain individual trees or snags. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Herbaceous vegetation reflects the site potential. *Mid-scale*: Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area. Openings with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. *Landscape:* The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass-forb-shrub vegetation associations similar to reference conditions. **OBJ:** Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually. **Mesic Mixed Conifer/Spruce-fir DC:** *Fine-scale:* Small openings (gaps) are present as a result of past disturbances. Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant diversity and ecosystem

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			function. Understory vegetation reflects site potential. *Mid-scale:* Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches. Grass, forb, and shrub dominated openings created by disturbance may make up 10 to 100 percent of the mid-scale patches (100 to 1,000 acres). **Aspen (General) DC:** Understory vegetation consists of shrubby or herbaceous species, providing forage and cover for wildlife and habitat for invertebrates such as pollinators. **Vegetation Management in All Forested Communities GD:** Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the references conditions. Trees established after 1890 should generally not be retained in areas where biophysical conditions would have supported stable openings over time. Vegetation management activities should meet or exceed goals for scenic beauty (scenic integrity objectives) by creating natural patterns, structure and composition of trees, shrubs, grasses and other plants. Vegetation treatments should favor the development of native understory species in areas where they have the potential to establish and grow. Seed and plants used for revegetation should originate from the same PNVT and general ecoregion (i.e., southern Colorado Plateau) as the project area. **Desert Communities DC:** Desert communities are characterized by extensive grasses with a shrub cover less than 30 percent. Ground cover canopy ranges from 5 to 40 percent. Shrubs contribute to native plant diversity and structure. **Cottonwood-Willow Riparian Forest DC:** Vegetation is characterized by willow and other herbaceous understory species. Snag and gallery tree components comprised 55 percent mid-aged to mature cottonwood and willow trees, 25 percent younger trees and 20 percent in grass, shrubs, suckers, seedlings, and tree sprouts. **Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration. **Wildlife DC:** Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. **Nonnative Invasive Species DC:** Invasive species are contained and controlled so that they do not disrupt the structure or function of ecosystems. **GD:** All ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna. **Livestock Grazing DC:** Livestock use is consistent with other desired conditions. **GD:** Livestock management should favor the development of native cool season grasses and forbs. Annual operating instructions for livestock grazing permittees should ensure livestock

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			numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness. **Mineral and Mining GD:** Restoration and reclamation of surface disturbance associated with mineral activities should be implemented to achieve 70 percent of ground cover (as compared to nearby undisturbed areas) with permanent native vegetation within three growing seasons.
Grassland dependent Golden eagle, western burrowing owl, ferruginous hawk, savannah sparrow, Arizona black rattlesnake, milksnake, Great Basin spadefoot, Kaibab Indra swallowtail, pronghorn, Gunnison's prairie dog, House Rock Valley chisel-toothed kangaroo rat, spotted bat, Navajo Mogollon vole	Native plant composition, openness.	Invasive plants, conifer/ woodland encroachment, unmanaged grazing.	**Pinyon-Juniper Grassland DC:** Pinyon-juniper grasslands are generally uneven-aged and open in appearance. Trees occur as individuals, but occasionally are in small groups and range from young to old. Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to maintain soil productivity, resist soil erosion and can support frequent low-intensity surface fires. Understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type and vegetation potential, bare soil varies between 10 and 60 percent. Basal vegetation varies between 5 and 50 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. The relative proportion of vegetation canopy cover averages 40 to 60 percent grass, 10 to 30 percent forbs, and 5 to 20 percent shrub. **Grasslands DC:** Vegetation is composed of a mix of native grasses and forbs. The structure, composition, and distribution of vegetation are within the range of natural variability and occur in natural patterns of abundance and diversity, which vary depending on soil type and microclimate. Disturbance processes are similar to reference conditions and play a primary role in the function of the ecosystem. Vegetation height and cover are sufficient to support the historic fire return interval. Understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type, bare soil varies between 5 and 80 percent. Basal vegetation varies between 5 and 60 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. Vegetation composition will average 40 to 60 percent grass, and 10 to 30 percent forbs. Understory vegetation reflects the site potential. Tree and shrub canopy cover are each less than 10 percent. **OBJ:** Reduce tree density to greater than 10 percent on 5,000 to 10,000 acres of historic grasslands annually. **GD:** In areas where native herbaceous cover is sparse and seed sources are depleted, seeding should be considered. **Colorado Plateau/Great Basin Grasslands DC:** Vegetation height and canopy cover are sufficient to carry fire under low wind conditions to support fire on a 10- to 30-year return

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			interval. **Semidesert Grasslands DC:** Vegetation height and canopy cover are sufficient to carry fire under low wind conditions to support fire on a 10- to 30-year return interval. **Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration. **Wildlife DC:** Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. **Non-Native Invasive Species DC:** Invasive species are contained and controlled so that they do not disrupt the structure or function of ecosystems. **GD:** All ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, tracked, and treated as soon as possible. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna. **Livestock Grazing DC:** Grasses and forbs provide adequate forage for permitted livestock. Livestock use is consistent with other desired conditions. **GD:** Livestock management should favor the development of native cool season grasses and forbs. Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness.
Meadow dependent Golden eagle, American peregrine falcon, California condor, savannah sparrow, Kaibab variable tiger beetle, four-spotted skippering, pronghorn, Gunnison's prairie dog, spotted bat, greater western mastiff bat, long- tailed vole, Navajo Mogollon vole, big free-tailed bat,	Moist meadows, loss of forbs, soil substrate.	Erosion, tree invasion, mechanical thinning, fire, trampling/soil compaction.	**Vegetation Management Activities GD:** Heavy equipment and log decks should not be staged in montane meadows. **Grasslands DC:** Vegetation is composed of a mix of native grasses and forbs. The structure, composition, and distribution of vegetation are within the range of natural variability and occur in natural patterns of abundance, which vary depending on soil type and microclimate. Disturbance processes are similar to reference conditions and play a primary role in the function of the ecosystem. Vegetation height and cover are sufficient to support the historic fire return interval. Understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type, bare soil varies between 5 and 80 percent. Basal vegetation varies between 5 and 60 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. Vegetation composition will average 40 to 60 percent grass, and 10 to 30 percent forbs. Understory vegetation reflects the site potential.Tree and shrub canopy cover are each less than 10 percent. **Montane/Subalpine Grasslands DC:** Montane meadows and subalpine grassland vegetation have high soil productivity and biological diversity. Native species occur in natural patterns

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dwarf shrew, Kaibab northern pocket gopher			of abundance, composition, and distribution. Vegetation is healthy and at least stable. Vegetation and litter is sufficient to maintain and improve water infiltration, nutrient cycling, and soil productivity. **Soil DC:** Soils provide for diverse native plant species. Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration. **Wildlife DC:** Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. **Nonnative Invasive Species DC:** Invasive species are contained and controlled so that they do not disrupt the structure or function of ecosystems above the fine scale. **GD:** All ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, tracked, and treated as soon as possible. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna. **Livestock Grazing DC:** Grasses and forbs provide adequate forage for permitted livestock. Livestock use is consistent with other desired conditions. **GD:** Livestock management should favor the development of native cool season grasses and forbs. Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). Post-fire grazing should not be authorized until Forest Service range staff confirms range readiness. The concentrated use of montane meadows for livestock grazing should be minimized when soils are saturated to reduce grassland impacts. When no other options are available, use should be rotated annually. **Transportation GD:** Roads should not be located in meadows when they can be located in other areas.
Shrubland dependent Sage sparrow, golden eagle, ferruginous hawk, sage thrasher, green-tailed towhee, Brewer's sparrow, Arizona black rattlesnake, Utah Mountain kingsnake, Persephone's darner, desert green hairstreak, pronghorn, spotted bat,	Native shrubs-species composition, openings.	Woodland invasion/succession unmanaged grazing	**Pinyon-Juniper Shrub DC:** The pinyon-juniper sagebrush shrub forest type is a mix of trees and shrubs that occur as shifting vegetation states (herbaceous-dominated, shrub-dominated, and tree-dominated) in even-aged and uneven-aged patches with a variable understory. There is a mix of large and small to mid-size juniper. The shrub component consists primarily of sagebrush, but, oak, cliffrose, and other shrub species may also be present. The understory is dominated by shrubs depending on structural stage. The shrub component consists of one or more shrub species, which are well-distributed. Shrubs typically are in a closed-canopy state during the later successional stages. The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances including insects, diseases, fire, and climate variability. **Sagebrush Shrublands DC:** The composition, structure, and function of biotic and abiotic components of sagebrush shrublands are within or moving toward reference conditions. The

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
bat free-tail bat, desert bighorn sheep			majority of sagebrush is in mid-seral or mature states. Enough shrub cover exists to meet the needs of a variety of sagebrush-obligate wildlife species. A vigorous, but not necessarily dense, understory community of native grasses and forbs are present. Understory vegetation reflects the site potential. Single trees or groups of trees cover less than 10 percent of any Terrestrial Ecosystem Survey (TES) map unit polygon and less than 5 percent of the community. Shrub cover is at least 5 percent, and typically makes up 20 to 50 percent of any TES soil unit. Characteristic disturbances play a role in the function of the ecosystem. **GD:** Prior to developing project proposals for restoring sagebrush communities, a determination should be made of the sagebrush sub-species because the differing sub-species indicate different desired reference conditions. Management activities should be designed to mimic the historic disturbance. Where sagebrush communities are severely degraded, waters should be strategically placed to improve animal distribution and reduce grazing impacts. **Desert Communities DC:** Desert communities are characterized by extensive grasses with a shrub cover less than 30 percent. Ground cover canopy ranges from 5 to 40 percent. Shrubs contribute to the native plant diversity and structure. Plant litter occupies up to 5 percent of the soil surface. Density of juniper and other shrubby species is maintained at levels which promote natural fire regimes and long fire return intervals. Fire occurrence is low and infrequent. Natural disturbance regimes include soil engineers such as arthropods and sometimes small mammals. Rocky outcroppings and shrubby plant species provide abundant browse and foraging opportunities for mule deer and bighorn sheep. Native ungulates are free from disease. Domestic livestock are absent. **GD:** Fire should not be used as a vegetation management tool in desert communities. **Gambel Oak Shrublands DC:** The system is dominated by native tall shrubs and hardwood trees. Some areas contain many trees with relatively large hollow boles or limbs. Coniferous trees are widely scattered and are frequently mature or old. Young Gambel oak thickets and sometimes other species comprise a patchy shrub layer. Ground cover is mostly comprised of oak litter, with grasses and forbs present. Low intensity fire occurs regularly with intervals of over 25 years. Nonnative species are absent or comprise less than 1 percent of the total cover. Old stands contain habitat for birds and arboreal nesting or roosting mammals. A variety of oak growth forms, sizes, and densities that benefit wildlife species can be found across the landscape. **Wildland Fire Management GD:** Decision documents for managing fire should evaluate the risk of cheatgrass invasion. When there is a moderate to high risk of cheatgrass invasion (e.g., lower elevation areas), mitigation measures should be implemented and/or fire should be excluded if adequate treatments are not available or if they are cost prohibitive. **Wilderness Areas GD:** Wildfires should be suppressed in the desert communities of the

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			Kanab Creek Wilderness.
Pinyon-juniper dependent Pronghorn, Juniper titmouse, black-throated gray warbler, pinyon jay, purple martin, gray vireo, Arizona black rattlesnake, western skink, Utah Mountain kingsnake, Great Basin spadefoot, Persephone's darner, desert green hairstreak, Kaibab Indra swallowtail, big free-tail bat	Openness of stands, diversity of stands.	Erosion, tree invasion, mechanical thinning, fire, trampling/soil compaction.	**Pinyon-Juniper Communities DC:** Pinyon-juniper communities occur as a shifting mosaic across the landscape interspersed with openings. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). At the mid-scale and above, canopy cover is at least 10 percent with a mix of young and groups and clumps of trees. The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and burls. Snags, green snags and downed trees greater than 10 inches at root collar are present and average 1 to 2 per acre. Some clumps have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (e.g., insects, diseases, and fire) and climate variability. Plant litter (leaves, needles, etc.) and understory plant cover contributes to soil stabilization, prevents erosion, promotes nutrient cycling, improves water retention, and provides the microclimate conditions necessary for pinyon seed germination. Nurse trees provide understory microclimate with improved nutrient and soil properties, higher soil moisture, and lower temperatures, and lower light levels, which increases the survival of pinyon seedlings under harsh conditions. A robust crop of pinyon pine nuts are regularly produced. **Pinyon-Juniper Grasslands DC:** Pinyon-juniper grasslands are generally uneven-aged and open in appearance. Trees occur as individuals, but occasionally are in small groups and range from young to old. Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to maintain soil productivity, resist soil erosion and can support frequent low-intensity surface fires. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, and severity of disturbances (including insects, diseases, and fire) and climate variability. Understory composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type and vegetation potential, bare soil varies between 10 and 60 percent. Basal vegetation varies between 5 and 50 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. The relative proportion of vegetation canopy cover averages 40 to 60 percent grass, 10 to 30 percent forbs, and 5 to 20 percent shrub. **Pinyon-Juniper Shrub DC:** The pinyon-juniper sagebrush shrub forest type is a mix of trees and shrubs that occur as shifting vegetation states (herbaceous-dominated, shrub-dominated,

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			and tree-dominated) in even-aged and uneven-aged patches with a variable understory. There is a mix of large and small to mid-size juniper. The shrub component consists primarily of sagebrush, but, oak, cliffrose, and other shrub species may also be present. The understory is dominated by shrubs depending on structural stage. The shrub component consists of one or more shrub species, which are well-distributed. Shrubs typically are in a closed-canopy state during the later successional stages. Litter and rock comprise the greatest percentage of ground cover. Grasses and forbs are sparse due to shrub dominance. The composition, structure, and function of vegetation conditions are resilient to the frequency, extent and severity of disturbances including insects, diseases, fire, and climate variability. **Pinyon-Juniper (Persistent) Woodlands DC:** Pinyon-juniper woodland (persistent) is characterized by even-aged patches of pinyons and junipers that at the landscape level form multi-aged woodlands. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous due to soil and other site conditions. Some very old trees (over 300 years old) are present. Disturbances rarely affect the composition, structure, and function. Insects, disease and mistletoe occur at endemic levels. **Pinyon-Juniper Communities GD:** The pinyon-juniper vegetation type (pinyon-juniper grassland, shrubland, or woodland) should be determined before developing project proposals to ensure the applicable desired conditions are applied. Restoration efforts should emphasize the retention of groups of mature trees where they occurred historically. Pinyon-juniper communities should maintain tree densities that maximize herbaceous plant growth and wildlife species diversity typical for their respective community subtype. Where pinyon-juniper obligate species occur (e.g., gray vireo), project designs should use methods (e.g., selective pruning, lop and drop, etc.) that emphasize the retention of key habitat features including snags, and partially dead or dying trees, and downed logs. Project design for vegetation management activities should prioritize treatment areas along known wildlife corridors, in the wildland-urban interface, and in historic openings. Restoration treatments in pinyon-juniper should be rotated over time and various successional stages to maximize wildlife habitat and diversity.
Riparian dependent American peregrine falcon, bald eagle, migratory birds, Arizona toad, Arizona treefrog, northern	Lowering of the water table, dense thickets of shrubby vegetation, structural heterogeneity,	Dewatering or channelization, invasion by nonnative species, treatments of exotic plant	**Wetland/Cienega DC:** Wetlands conditions are consistent with their flood regime and flood potential. Plant and animal species that require wetland habitats have healthy populations within the natural constraints of the particular wetland community. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly. **OBJ:** Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval. **Cottonwood Willow Riparian DC:** The extent, diversity, and condition of riparian habitat

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leopard frog, Great Basin spadefoot, western red bat	full complement of tree age size classes, snags, streamside vegetation,	species (mechanical removals, herbicides), livestock/ grazing, wildfire	contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. Vegetation is characterized by willow and other herbaceous understory species. Snag and gallery tree components comprise 55 percent mid-aged to mature cottonwood and willow trees, 25 percent younger trees and 20 percent in grass, shrubs, suckers, seedlings, and tree sprouts. Vegetation is structurally diverse and provides habitat for high bird species diversity and abundance with nesting and foraging opportunities for neotropical migrants birds. Mature cottonwood and other trees provide cavities for cavity-dependent wildlife such as woodpeckers, sapsuckers and secondary cavity users. Tall trees provide lookouts and opportunities for nesting raptors. Water flow regime approximates reference conditions (i.e., perennial flows) and flows freely. Sedimentation is minimized. Springtime flooding contributes to ecosystem sustainability by optimizing germination conditions for seedlings and/or suckering opportunities from the parent plant. When nonnative vegetation is present, the spatial and structural composition contributes to overall faunal diversity. Grazing from domestic ungulates is minimal or absent. Soil is free from compaction and includes sand and gravelly reaches and provides suitable germination sites for desirable plant species. Sandy and vegetated terraces provide habitat for reptiles and amphibians. Shallow exposed watersides provide drinking and foraging opportunities for wildlife. Fire is limited or absent in this system. **Soils and Watersheds GD:** Seeds and plants used for revegetation should originate from the same PNVT and general ecoregion (i.e., southern Colorado Plateau) as the project area. **Natural Waters DC**: The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species. Riparian-dependent plant and animal species are self-sustaining and occur in natural patterns of abundance and distribution. Native macroinvertebrates are appropriately abundant and diverse. Unwanted nonnative species do not exert a detectable impact on aquatic and wetland ecosystems. Springs, streams and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. **Non-Native Invasive Species GD:** Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna. **Livestock Grazing GD:** Livestock use in and around wetlands should be evaluated on an allotment-specific basis. Mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects.
Water dependent	Lowering or depletion of the	Wetland drainage, spring	**Wetland/Cienega DC:** Wetlands conditions are consistent with their flood regime and flood potential. Plant and animal species that require wetland habitats have healthy populations

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(wetlands, seeps/springs, waters) American peregrine falcon, bald eagle, migratory birds, spikedace, Apache trout, loach minnow, Arizona toad, Arizona treefrog, northern leopard frog, Great Basin spadefoot, Kaibab fairy shrimp, Nevada point-head grasshopper, Persephone's darner, hoary skimmer, four-spotted skippering, Nokomis fritillary, Nokomis fritillary ssp. nokomis, pale Townsend's big-eared bat, spotted bat, greater western mastiff bat, Allen's lappet-browed bat, western red bat, southwestern myotis,	water table, edge vegetation, connectivity/ stopover habitat for migrating birds.	capping, flood scouring, overgrazing, trampling.	within the natural constraints of the particular wetland community. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly. **OBJ:** Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval. **Watershed DC:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. **Natural Waters DC:** Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Within its capability, stream flow and water quality is adequate to maintain aquatic habitat and water sources for native and selected nonnative wildlife. The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species. Riparian-dependent plant and animal species are self-sustaining and occur in natural patterns of abundance and distribution. Within its capability, streamflow and water quality are adequate to maintain aquatic habitat and water sources for native and desired nonnative species. Native macroinvertebrates are appropriately abundant and diverse. Unwanted nonnative species do not exert a detectable impact on aquatic and wetland ecosystems. Native amphibians are free from or minimally impacted by nonnative predation and diseases. Springs, streams and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. Hydrophytes and emergent vegetation exist in patterns of natural abundance in wetlands and springs in levels that reflect climatic conditions. Overhanging vegetation and floating plants such as water lilies exist where they naturally occur. Where springs or other natural waters have been modified for livestock and/or human consumption, developments are operational. **OBJ:** Protect and/or restore at least 10 individual springs within 5 years of plan approval. **GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease. Fences constructed around natural waters should allow bats and other desirable wildlife to pass through unharmed. Diversions of water sources that recharge wetlands should be assessed and appropriate actions should be identified to mitigate or minimize effects. Spring source areas should be preferentially protected. Water rights for springs should be secured where there are no existing water rights or claims. The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized. **Constructed Waters DC:** Drinkers have escape ramps that provide safe access and egress

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			for wildlife. Constructed waters do not contribute to the spread of chytrid fungus or unwanted nonnative species, Reservoirs maintain high quality for parameters such as temperature, dissolved oxygen, and water levels within the seasonal range of variable conditions. Desirable nonnative fish species provide recreational fishing opportunities in reservoirs and lakes consistent with the needs of native species. **GD:** Scholz Lake should not be managed for recreational sport fishing. In riparian aquatic areas, current protocols for preventing the spread of chytrid fungus should be followed. If new drinkers are necessary, they should be constructed in areas that reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas. Drinkers should be maintained to provide water during times of scarcity. **Livestock Grazing GD:** Livestock use in and around wetlands should be evaluated on an allotment-specific basis. Mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects. **Wilderness DC:** A reproducing population of Apache trout is maintained in North Canyon Creek. **Frank's Lake Geologic-Botanic Area GD:** Livestock should be excluded from the Frank's Lake Geologic Botanic Area.
Species affected by sediments into natural waters Spikedace, Apache trout, loach minnow, Arizona toad, Arizona treefrog, northern leopard frog, Kaibab fairy shrimp	Loss of habitat function, increase in sediments above background level.	Erosion, unmanaged grazing.	**Pinyon-Juniper Communities DC:** Plant litter (leaves, needles, etc.) and understory plant cover contributes to soil stabilization, prevents erosion, promotes nutrient cycling, improves water retention, and provides the microclimate conditions necessary for pinyon seed germination. **Ponderosa Pine DC:** *Fine:* Organic ground cover and herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Herbaceous vegetation reflects the site potential. **Frequent Fire Mixed Conifer DC:** *Fine:* Organic ground cover and herbaceous vegetation provide protection for soil, and moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Herbaceous vegetation reflects the site potential. **Mesic Mixed Conifer/Spruce-Fir DC:** *Fine:* Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Understory vegetation reflects the site potential. **Following Large-scale Disturbances GD:** Recovery and restoration projects design should seek to establish a trajectory toward desired conditions for the affected vegetation type. Erosion control should be implemented to protect significant resource values and infrastructure such as stream channels, roads, structures, and archeological or historic sites. Practices that restore nutrient cycling and stabilize soils (revegetation, mulching, lop and scatter, etc.) should be implemented.

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			Montane/Subalpine Grasslands DC: Montane and subalpine meadow vegetation has high soil productivity and biological diversity. Vegetation and litter is sufficient to maintain and improve water infiltration, nutrient cycling, and soil productivity. **Wetland/Cienega DC:** Wetlands provide habitat consistent with their flood regime and flood potential. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly. **Soil DC:** Vegetative ground cover is well-distributed across the soil surface to promote nutrient cycling and water infiltration. Accelerated soil loss is minimal, especially on sensitive or highly erodible sites. Soils can readily absorb, store, and transmit water vertically and horizontally, accept, hold, release nutrients, and resist erosion. Infiltration rates are good in TES soil units that are described as well drained and moderately well-drained. **Watershed DC:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, gully erosion and subsequent sedimentation into connecting waters downstream is minimal. Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, sinuosity). Vertical down cutting and embeddedness are absent in drainages. Floodplains are functioning and lessen the impacts of floods on human safety, health, and welfare. The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance. Water quality meets or exceeds State of Arizona or Environmental Protection Agency water quality standards for designated uses. Water quality meets critical needs of aquatic species. **Soils and Watershed GD:** Projects should include design features to protect and improve watershed condition. In disturbed areas, erosion control measures should be implemented to improve soil conditions. **Natural Waters DC:** Stream channel stability and aquatic habitats retain their inherent resilience disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff and sediment supply appropriate to the landscape setting. **GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease. **Wildland Fire Management DC:** Wildland fire maintains and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role. Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects. Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale. **Transportation System OBJ:** Obliterate or naturalize 20 miles of non-system roads

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			(unauthorized, unneeded, and decommissioned) within 10 years of plan approval. **GD:** Roads should be decommissioned when no longer needed. **Mineral and Mining Activities GD:** Adverse surface impacts should be minimized through the appropriate administration of mining and mineral laws and regulations. Soil disturbance should be kept to a minimum. Restoration and reclamation of surface disturbance associated with mining operations should be implemented to achieve 70 percent of ground cover (as compared to nearby undisturbed areas) with permanent native vegetation within 3 growing seasons.
Aspen dependent Red-faced warbler, evening grosbeak, olive-sided flycatcher, dusky grouse, MacGillivray's warbler, red-naped sapsucker, orange-crowned warbler, Kaibab least chipmunk, Kaibab northern pocket gopher	Regenerating of stands, diversity in age within stands, conifer encroachment.	Ungulate grazing.	**Frequent Fire Mixed Conifer DC:** *Landscape:* Where they occur naturally, groups of aspen and all structural stages of oak are present. **Mesic Mixed Conifer/Spruce-Fir DC:** *Mid-scale:* Aspen is occasionally present in large patches. **Aspen (General) DC:** Aspen stands are characterized by disturbances which may include fire, mechanical thinning, insects, pathogens and abiotic factors. Collectively these agents of change promote healthy tree regeneration, decadence, and nutrient cycling. These processes further contribute to high-quality wildlife habitat and biodiversity. Aspen occurs in natural patterns of abundance and distribution at levels similar to or greater than those at time of plan approval. Aspen is successfully regenerating and recruiting into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smallest classes. Fire intervals are similar to reference conditions and maintain aspen. Understory vegetation consists of shrubby or herbaceous species, providing forage and cover for wildlife and habitat for invertebrates such as pollinators. **Aspen within Ponderosa Pine and Frequent Fire Mixed Conifer Forest DC:** In ponderosa pine and frequent fire mixed conifer vegetation types, the size, age and spatial extent of aspen stands reflect reference conditions. Coniferous species comprise less than 10 percent of the overstory on the Tusayan and Williams Ranger Districts. Isolated aspen stands, diverse in vegetation structure and composition, provide wildlife refugia and diversity in an otherwise conifer-dominated landscape. **Aspen within Mesic Mixed Conifer /Spruce-Fir Forest DC:** Downed aspen and woody debris are scattered across the landscape and provide habitat for a variety of wildlife species (e.g., small mammals, reptiles, amphibians, and birds) while contributing to efficient nutrient cycling. Aspen occurs as a shifting mosaic across its range with new aspen clones establishing over time. The size, age, and spatial extent of aspen stands reflect large-scale disturbance patterns and processes. **Aspen on Williams and Tusayan Ranger Districts OBJ:** Fence 200 acres of aspen within 10 years of plan approval to exclude ungulates. Reduce conifer encroachment on 800 acres of

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			aspen within 10 years of plan approval. **GD:** Small patch clear-cuts (less than 5 acres in size), conifer removal, and wildland fire should be used to stimulate aspen sprouting in areas that have or previously had aspen. Aspen trees 10 inches or greater d.b.h. (both live and dead) should be protected during project activities, except where they may pose a risk to fences or regeneration efforts. Fences should be regularly inspected and maintained while aspen recovers. Fences should be removed when no longer needed. **Constructed Water DC:** Artificial waters do not concentrate ungulate use in aspen stands. **GD:** If new drinkers are necessary, they should be constructed in areas that reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas. **Livestock Grazing GD:** Livestock use in aspen areas should be authorized at levels that are consistent with the desired conditions for aspen regeneration and establishment.
Rock/cave and other abiotic dependent Golden eagle, American peregrine falcon, California condor, Arizona black rattlesnake, western skink, Utah Mountain kingsnake, milksnake, Great Basin spadefoot, pale Townsend's big-eared bat, House Rock Valley chisel-toothed kangaroo rat, spotted bat, greater western mastiff bat, Allen's lappet-browed bat, southwestern myotis, big free-tailed bat, dwarf shrew,	Rocks (canyons, caves, mines, ledges, talus slopes, and cliffs), manmade habitat (buildings, bridges).	Rock collection, cliff blasting, recreational rock climbing/ caving, mining/ mineral activities.	**Caves, Karst, and Mines DC**: Caves maintain moisture and temperature levels consistent with reference conditions. Archeological, geological, and biological features of caves and mines are not disturbed by visitors. Caves, karst features, and abandoned mines provide quality habitat for bat species. Disease is within natural levels. Mine closures do not compromise habitat for species that require specialized niches for roosting and overwintering (e.g., bats). **GD**: Project design should include protections for subsurface geologic features to minimize disruptions to cave microbiology and other aspects of cave ecology. When entering caves or mines, decontamination procedures should be followed for preventing the spread of white-nose syndrome (*Geomyces destructans*). Caves containing endemic species should be managed for the protection of that species over other uses. Before closing caves or mines, they should be inspected to determine if bats are using these areas. If roost sites are present, closure structures should allow bats to continue to use the cave or mine, such as wildlife friendly bat gates that meet the most current recommendations. **Cliffs and Rocky Features DC:** Cliff ledges provide cover and nesting habitat for wildlife such as the American peregrine falcon, California condor, snakes, bats, birds, and small mammals. Rocks and rocky areas promote seedling germination and maintain cover for vertebrate and invertebrate species. Rock climbing and related recreational activities do not disrupt the life processes of rare or threatened species or diminish the function of specialized vegetation, such as mosses, lichens, and fleabanes. Rockslides and talus slopes are natural, undisturbed features that provide habitat for wildlife such as lizards, snakes, and land snails. **GD:** Activities involving heavy machinery or blasting should minimize impacts to habitat associated with rocky features and cliffs. Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially

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			disruptive activities. Talus slopes should be surveyed for endemic species prior to authorizing quarrying, rock hounding, or construction activities that may alter them. **Transportation GD:** Surveys should be conducted to assess wildlife use (bats, birds, etc.) and intensity before demolishing and/or modifying structures such as old bridges. If surveys determine that wildlife actively use the structures, project design should include efforts to minimize impacts. **Developed Recreation Sites GD:** Surveys should be conducted to assess bat activity and intensity of use before demolishing and/or modifying structures such as old buildings. If surveys determine that bats are actively roosting in such structures and no alternate bat roost sites exists in the immediate vicinity, project design should include efforts to minimize impacts and to provide for alternate roost sites such as bat boxes where feasible.
Species needing connected habitat/movement corridors Pronghorn, Gunnison's prairie dog, elk, mule deer, mountain lion	Large contiguous blocks of habitat.	Habitat fragmentation.	**Pinyon-Juniper Communities DC:** Pinyon-juniper communities occur as a shifting mosaic across the landscape interspersed with openings. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. **GD:** Pinyon-juniper communities should maintain tree densities that maximize herbaceous plant growth and wildlife species diversity typical for their respective community subtype. Project design for vegetation management activities should prioritize treatment areas along known wildlife, in the wildland-urban interface, and in historic openings. Restoration treatments in pinyon-juniper should be rotated over time and various successional stages to maximize wildlife habitat and diversity. **Restoring Grasslands OBJ:** Reduce tree density to less than to 10 percent on 5,000 to 10,000 acres of historic grasslands annually. Modify fences and install crossings to facilitate pronghorn movement on 50 miles of fence within 10 years of plan approval. **GD:** Pronghorn fence crossings should be installed along known movement corridors. **Wildlife DC:** Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife are present and in balance with healthy, functioning ecosystems. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Interconnected habitats allow for movement of wide-ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g., mountain lions). Habitat configuration and availability allows wildlife populations to adjust their movements (e.g., seasonal migration, foraging etc.) in response to climate change and promote genetic flow between wildlife populations. **Livestock Grazing DC:** Allotment fencing allows for passage of animals prone to movement

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			restrictions such as pronghorn. **GD:** New construction and reconstruction of fences should have a barbless bottom wire and be at least 18 inches high. **Transportation and Forest Access DC:** Roads allow for safe and healthy wildlife movement in areas of human development. Vehicular collisions with animals are rare. **GD:** Roads should be decommissioned when no longer needed. **Lands DC:** NFS lands exist in a pattern that promotes efficient management, which consist of large contiguous areas that provide efficient and effective resource management and wildlife connectivity within and across NFS lands. **Wilderness DC:** Wilderness provides opportunities for nonmotorized and non-mechanized primitive and unconfined recreation and contiguous wildlife habitat. **Recommended Wilderness DC:** The recommended wilderness areas provides non-motorized and non-mechanized opportunities for primitive and unconfined recreation and contiguous wildlife habitat.
Rare endemics/ restricted distributions Arizona black rattlesnake, Utah Mountain kingsnake, Persephone's darner, Kaibab variable tiger beetle, Kaibab Indra swallowtail, House Rock Valley chisel-toothed kangaroo rat, Kaibab least chipmunk, Kaibab tree squirrel, Kaibab northern pocket gopher	Rare habitat and the species itself. Direct loss of vegetation, change in species composition, and microsite conditions.	Collecting, trampling, herbicide treatments, misidentification and accidental eradication, pile burning, unmanaged livestock grazing and excessive wildlife herbivory	**Wildlife GD:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly raptors. **Rare and Narrow Endemics DC:** Habitat and refugia are present for narrow endemics or species with restricted distributions and/or declining populations. Location and conditions of rare and narrow endemic species are known. **GD:** Project design should incorporate protective measures to provide for rare and narrow endemic species where they are likely to occur. **Caves, Karst, and Mine GD:** Caves containing endemic species should be managed for the protection of those species over other uses.
Risk of Large-scale Wildfire All species	Loss of habitat components on a large scale.	Fire behaving unnaturally within the system.	**Pinyon-Juniper Communities DC:** The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances (including insects, diseases, and fire) and climate variability. Fires are typically low severity with a 0- to 35-year return interval (Fire Regime I). **Pinyon-Juniper Grasslands DC:** The composition, structure, and function of vegetative

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			conditions are resilient to the frequency, extent and severity of disturbances (including insects, diseases, and fire) and climate variability. Fires are typically low severity with a 0- to 35-year return interval (Fire Regime I). **Pinyon-Juniper Shrub DC:** The composition, structure, and function of vegetation conditions are resilient to the frequency, extent and severity of disturbances including insects, diseases, fire, and climate variability. Fires are mixed to high severity and have fire return interval of 35 to more than 200 years (Fire Regimes III, with occurrences of stand replacing fire at longer intervals). **Pinyon-Juniper (Persistent) Woodlands DC:** Disturbances rarely affect the composition, structure, and function. Fire disturbance is infrequent and variable due to lack of continuous ground cover. **Ponderosa Pine Forest DC:** *Fine-scale*: Fires generally burn as surface fires, but single-tree torching and isolated group torching is not uncommon. *Mid-scale*: Disturbances sustain the overall variation in age and structural distribution. Fires primarily burn on the forest floor and typically do not spread between tree groups as crown fire. *Landscape:* The landscape is a functioning ecosystem that contains all its components, processes, and conditions associated with endemic levels of disturbances (e.g., fire, dwarf mistletoe, insects, diseases, lightning, drought, and wind). Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris loads, and nutrient cycling. The risk of uncharacteristic high intensity fire and associated loss of key ecosystem components is low. Frequent, low-severity fires (Fire Regime I) occur across the entire landscape with a return interval of 0 to 35 years. **OBJ:** Mechanically thin 11,000 to 19,000 acres annually. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. **Frequent Fire Mixed Conifer DC:** *Fine-scale*: Fires generally burn as surface fires, but single tree torching and isolated group torching occasionally occurs. *Mid-scale*: Fires primarily burn on the forest floor and typically do not spread between tree groups as crown fire. *Landscape:* The composition, structure, and function of vegetative conditions are resilient to the frequency, extent, severity of disturbances, and to climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., fire, insects, diseases, and wind). Grasses and needle cast provide the fine flashy fuels needed to maintain the natural fire regime. Fire and other disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Frequent, low severity fires (Fire Regime I) occur across the entire landscape with a return interval of 0 to 35 years.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			OBJ: Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually. **Mesic Mixed Conifer/Spruce-Fir DC:** *Fine-scale*: Due to the presence of ladder fuels, fires usually burn either with low intensity, smoldering combustion, or transition rapidly in the canopy as passive or active crown fire. *Mid-scale*: During moister conditions, fires exhibit smoldering low-intensity surface fires with single-tree and isolated group torching. Under drier conditions, fires exhibit passive to active crown fire behavior with conifer tree mortality up to 100 percent across mid-scale patches (100 to 1,000 acres). High-severity fires generally do not result in areas of mortality exceeding 1,000 acres. Other smaller disturbances occur more frequently. Fire and other disturbances maintain overall desired tree density, structure, species composition, coarse woody debris, and nutrient cycling. Fire severity is mixed or high, with a fire return interval of 35 to over 200 years (Fire Regimes III, IV, and V). *Landscape:* The forest landscape is a functioning ecosystem that contains all components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, wind, snow, and fire), including snags, downed logs, and old trees. The composition, structure, and function of vegetative conditions are resilient to the frequency, extent and severity of disturbances and climate variability. Mixed-severity fire (Fire Regime III) is characteristic at the lower elevations of this type. High-severity fires (Fire Regime IV and V) are more common at the higher elevations. **Aspen (General) DC:** Fire intervals are similar to reference conditions and maintain aspen. **Vegetation Management in all Forested Communities GD:** The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire. Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the references conditions. **Large-scale Disturbance OBJ**: To reestablish ponderosa pine in areas with inadequate seed source and reduce the time to achieve the desired forest structure: Plant 300 to 700 acres annually. **GD**: Recovery and restoration project design should seek to establish a trajectory toward the desired conditions for the affected vegetation type. Where conifer seed sources are lost or poorly distributed due to high-intensity fire, artificial regeneration (planting, etc.) should be implemented to promote the desired forest structure and accelerate the recovery of habitat conditions for native wildlife species. Some snags and coarse woody debris should be retained to provide for wildlife habitat, soil stabilization, and other resource benefits. Some clumps of large (18 inches d.b.h.) standing dead trees should be retained. Project design should incorporate measures to protect regeneration and reforestation investments.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			Sagebrush Shrublands DC: Characteristic disturbances play a role in the function of the ecosystem. **GD:** Management activities should be designed to mimic the historic disturbance. **Grasslands DC:** Disturbance processes are similar to reference conditions and play a primary role in the function of the ecosystem. **Desert Communities DC:** Density of juniper and other shrubby species is maintained at levels which promote natural fire regimes and long fire return intervals. Fire occurrence is low and infrequent. **GD:** Fire should not be used as a vegetation management tool in Desert Communities. **Gambel Oak Shrublands DC:** Low intensity fire occurs regularly with intervals of greater than 25 years. **Cottonwood-Willow Riparian Forest DC:** Fire is limited or absent in this system. **Watersheds DC:** The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance. **Livestock Grazing GD:** As grazing permits are waived back to the forest, they should be evaluated for conversion to forage reserves to improve flexibility for restoring fire-adapted ecosystems and range management in times of drought. **Forestry and Forest Products DC:** A sustainable supply of wood is available to support a wood harvesting and utilization industry of a size and diversity that can effectively and efficiently restore and maintain the desired conditions for ponderosa pine and frequent fire mixed conifer communities. **Wildland Fire Management DC:** Wildland fire maintains, and enhances resources and, as nearly as possible, is allowed to function in its natural ecological role. Regular fire entry protects social, economic, and ecological values at risk from high-severity disturbance effects. Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale. Wildland fire is understood, both internally and by the public, as a necessary natural disturbance process integral to the sustainability of the forest's fire-adapted vegetation communities. **ST:** Managers will use a decision support process to guide and document wildfire management decisions. **GD:** Decision documents for wildland fires that progress past initial attack should include interdisciplinary input to assess site specific values at risk and develop project or incident objectives and courses of action to enhance or protect those values. Decision documents for wildland fires should include objectives to minimize fire-created openings to those within the reference range of variability for the vegetation community. Associated courses of action to address those objectives should also be developed. Decision documents for wildland fires

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			should address wildlife desired conditions for key habitat features that provide structural diversity such as snags, large oaks, and oak thickets. Associated courses of action or management practices to address those objectives should also be developed. If current or anticipated fire behavior and fire effects exceed the desired fire behavior and effects, protection objectives should be developed, or a more conservative prescription window produced. Strategies and tactics to mitigate those effects should be implemented on active wildland fires. **Wilderness DC:** Natural processes are maintained within the wildernesses. Fires function in their natural ecological role. **GD:** Wildfires should be suppressed in the desert communities of the Kanab Creek Wilderness. **Recommended Wilderness DC:** Natural processes are maintained within the wildernesses. Fires function in their natural ecological role. **GD:** Wildfires should be suppressed in the recommended wilderness areas adjacent to Kanab Creek in the desert communities PNVT. **Garland Prairie Management Area DC:** Lightning fires are able burn naturally within the area. **Bill Williams Mountain Management Area OBJ:** Implement a project to improve the health and sustainability of forested conditions on and surrounding Bill Williams Mountain within 5 years of plan approval.
Invasive Species Interactions, e.g., but not limited to noxious weeds, crayfish and bullfrogs Sage sparrow, golden eagle, western burrowing owl, ferruginous hawk, sage thrasher, savannah sparrow, green-tailed towhee, Apache trout, Arizona toad, Arizona black rattlesnake, Arizona treefrog,	Competition for resources (food, space, water) and/or hybridizations which can lead to direct mortality and decreases in populations within the planning area, loss of native species and changes in vegetation	Introduction of nonnative species; loss of habitat component.	**Grasslands DC:** Vegetation is dominated by herbaceous plants composed of a mix of native grasses and forbs. **Montane/Subalpine Grasslands DC:** Native species occur in natural patterns of abundance, composition, and distribution. Vegetation is healthy and at least stable. **Gambel Oak Shrublands DC:** The system is dominated by native tall shrubs and hardwood trees**.** Non-native species are absent or comprise less than 1 percent of the total cover. **Cottonwood-Willow Riparian Forest DC:** When nonnative vegetation is present, the spatial and structural composition contributes to overall faunal diversity. **Natural Waters DC:** Unwanted nonnative species do not exert a detectable impact on aquatic and wetland ecosystems. Native amphibians are free from or minimally impacted by nonnative predation and diseases. **GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease. **Constructed Waters DC:** Constructed waters do not contribute to the spread of chytrid fungus or unwanted nonnative species.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
northern leopard frog, Great Basin spadefoot, pronghorn, Navajo Mogollon vole	structure.		**Nonnative Invasive Species DC:** Invasive species are contained and/or controlled so that they do not disrupt the structure or function of ecosystems. **GD:** All ground-disturbing projects should assess the risk of noxious weed invasion and incorporate measures to minimize the potential for the spread of noxious and invasive species. New populations are detected early, monitored, and treated as soon as possible. Treatment approaches should use integrated pest management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments. Use of pesticides, herbicides, and biocontrol agents should minimize impacts on non-target flora and fauna. **Wildland Fire Management GD:** Decision documents for managing fire should evaluate the risk of cheatgrass invasion. When there is a moderate to high risk of cheatgrass invasion (e.g., lower elevation areas), mitigation measures should be implemented and/or fire should be excluded if adequate treatments are not available or if they are cost prohibitive. **Wilderness DC:** Wilderness areas have minimal to no nonnative, invasive species. **GD:** Wildfires should be suppressed in the desert communities of the Kanab Creek Wilderness. Nonnative, invasive species should be treated within wilderness in order allow natural processes to predominate. **Recommended Wilderness DC:** Recommended wilderness areas have few to no nonnative, invasive species. **GD:** Wildfires should be suppressed in the recommended wilderness areas adjacent to Kanab Creek in the desert communities vegetation type. Nonnative, invasive species should be treated within recommended wilderness areas in order allow natural processes to predominate. **Pediocactus Conservation Area GD:** Nonnative invasive weeds should be regularly monitored and promptly treated
Poisoning/Pesticide Use Golden eagle, California condor, bald eagle, pale Townsend's big-eared bat, Gunnison's prairie dog, Allen's lappet-browed bat, big free-tailed bat	Unintentional poisoning of species or misuse of herbicide or pesticide.	Nontarget species poisoning	**Invasive Species GD:** Treatment approaches should use integrated pest management (IPM) practices to treat noxious and nonnative invasive species. IPM includes manual, biological, mechanical, and herbicide/pesticide treatments. Pesticides should be properly labeled and stored as per the manufacturer's recommendations.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
Disease Arizona toad, Arizona treefrog, northern leopard frog, pale Townsend's big-eared bat, Gunnison's prairie dog, spotted bat, greater western mastiff bat, Allen's lappet-browed bat, southwestern myotis, big free-tailed bat, desert bighorn sheep	Human activities that result in the spread of disease through infected soil and water from one occupied site to another can kill wildlife; activities can include recreation, research, and fire and grazing management.	Loss of populations or decline in habitat effeteness	**Desert Communities DC:** Native ungulates are free from disease. **Natural Waters DC:** Native amphibians are free from or minimally impacted by nonnative predation and diseases. **GD:** Access to natural waters should be restricted to designated trails and points of entry to mediate erosion, prevent trampling, and prevent inadvertent introduction of nonnative and undesirable biota and disease. Activities in and around waters should use decontamination procedures to prevent the spread of chytrid fungus **Constructed Waters DC:** Constructed waters do not contribute to the spread of chytrid fungus or unwanted nonnative species. **GD:** Activities in and around waters should use decontamination procedures to prevent the spread of chytrid fungus. **Caves, Karst, and Mines DC:** Disease is within natural levels. **GD:** When entering caves or mines, decontamination procedures should be followed for preventing the spread of white-nose syndrome (*Geomyces destructans*). **Livestock Grazing GD:** Grazing of domestic sheep and goats should not be authorized on the Tusayan and North Kaibab Ranger Districts due to the proximity of bighorn sheep in Grand Canyon and Kanab Creek to prevent the spread of disease between domestic and wild populations.
Development (facilities, roads, fences) Golden eagle, western burrowing owl, ferruginous hawk, California condor, bald eagle, milksnake, pronghorn, Gunnison's prairie dog, bats, raptors	Human structures such as fences, buildings, and bridges, electrical power lines, demolition of existing structures.	Potential removal of habitat components, creating barrier to movement.	**Restoring Grasslands OBJ:** Modify fences and/or install crossings to facilitate pronghorn movement on 50 miles of fence within 10 years plan approval. **GD:** Pronghorn fence crossings should be installed along known movement corridors. **Natural Waters DC:** Where springs or other natural waters have been modified for livestock and/or human consumption, developments are operational. **GD:** Fences constructed around natural waters should allow bats and other desirable wildlife to pass through unharmed. Diversions of water sources that recharge wetlands should be assessed and appropriate actions should be identified to mitigate or minimize effects. The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized. **Constructed Waters DC:** Drinkers have escape ramps that provide safe access and egress for wildlife. Reservoirs maintain high quality for parameters such as temperature, dissolved oxygen, and water levels within the seasonal range of variable conditions. Artificial water sources do not concentrate ungulate use in aspen stands. **GD:** If new drinkers are necessary, they should be constructed in areas that reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			Drinkers should be maintained to provide water during times of scarcity. **Recreation and Scenery DC:** Opportunities for off-highway vehicle (OHV) riding and driving for pleasure are available on the designated system of NFS roads and motorized trails. **Recreation Front Country DC:** Constructed facilities in front country settings provide for user comfort and resource protection. The number and size of constructed facilities is appropriate for the use and activities that occur at each site. **GD:** Any new motorized trailheads should be located in front country areas, incorporate or convert existing roads, protect open space, and protect natural and cultural resources. **Livestock Grazing DC:** Allotment fencing allows for passage of animals prone to movement restrictions such as pronghorn. **GD:** New construction and reconstruction of fences should have a barbless bottom wire and be at least 18 inches high. **Transportation and Forest Access DC:** All designated routes open to wheeled motorized vehicles are shown on a motor vehicle use map (MVUM) that is readily available to the public. Roads allow for safe and healthy wildlife movement in areas of human development. Vehicular collisions with animals are rare. **ST:** Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety. **GD:** Construction of permanent roads or temporary roads in semi-primitive non-motorized areas should be avoided unless required by a valid permitted activity. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use. Roads should not be located in meadows when they can be located in other areas. Roads should be decommissioned when no longer needed. Surveys should be conducted to assess bat activity and intensity of use before demolishing and/or modifying structures such as old bridges. If surveys determine that wildlife are actively using structures, project design should include efforts to minimize impacts. **Energy Transmission and Development DC:** Energy transmission and development on the forest meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area. Joint use of rights-of-way is provided to concentrate uses to the extent possible. Energy transmission lines are not visible (usually underground) across the landscape. Vegetative conditions and land uses within energy rights-of-way facilitate the operation and maintenance of the associated facilities and infrastructure. They may differ from the surrounding PNVT desired conditions in that they generally consist of low-growing or non-woody vegetation. **ST:** Major utility corridor development is confined to the area identified and mapped in the

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			West-wide Energy Corridor Programmatic EIS. **GD:** Environmental disturbance should be minimized by co-locating pipelines, power lines, fiber optic lines, and associated infrastructure. Existing energy corridors should be used to their capacity with compatible upgraded power lines, before evaluating new routes. When compatible with protection of heritage resources, the use of below-ground utilities should be optimized in order to avoid potential conflicts with wildlife, scenery, wildfire, and long-term vegetative management. **Frank's Lake Geologic-Botanic Area DC:** There is minimal evidence of human disturbance. **Developed Recreation Sites GD:** Reconstruction and improvements of private sector developed sites should be within site capacity allocations. Surveys should be conducted to assess bat activity and intensity of use before demolishing and/or modifying structures such as old buildings. If surveys determine that bats are actively roosting in such structures and no alternate bat roost sites exists in the immediate vicinity, project design should include efforts to minimize impacts and to provide for alternate roost sites such as bat boxes where feasible. Developed recreation site vegetation management plans should guide thinning and burning activities in the campgrounds. **Bill Williams Mountain Management Area GD:** The existing term permit for the Elk Ridge Ski Area on Bill Williams Mountain should be restricted to the existing established permit area. High-use roads within the municipal watershed should be maintained to prevent erosion and sedimentation. **Red Butte Management Area GD:** The helipad on Red Butte should only be used for administrative purposes. **Pediocactus Conservation Area GD:** Motorized access should be restricted.
Disturbance to wildlife from management activities Goshawk, golden eagle, American peregrine falcon, California condor, raptors	Potential disturbance to species during breeding season	Timber harvest, recreation activities, fuel reduction activities, road building, mineral collections	**Wildlife DC:** Human-wildlife conflicts are minimal. **Wildlife GD:** Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15. **Threatened, Endangered, and Sensitive Species GD**: Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30. **Cliffs and Rocky Features GD:** Near known active raptor nest sites, temporary closures and use restrictions should be implemented for rock climbing and other potentially disruptive activities. **Recreation and Scenery GD:** Group uses should be concentrated in front country areas. Resource impacts should be reduced in front and backcountry by directing camping to existing dispersed campsites.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
			Transportation Management ST: Motor vehicle use off the designated system of roads, trails, and areas is prohibited, except as identified on the MVUMs and as authorized by law, permits, and orders in connection with resource management and public safety. **Wilderness Areas DC:** Wilderness provides opportunities for nonmotorized and nonmechanized primitive and unconfined recreation and contiguous wildlife habitat. Human encounters are only with individuals or small parties, are infrequent, and opportunities for solitude are common. **ST:** Group size in wilderness is limited to 12 people. Competitive events are not permitted in wilderness areas. Establishment geo-caches will not be permitted in wilderness areas. **Frank's Lake Geologic-Botanic Area GD:** Camping within the fenced boundary of Frank's Lake should not be permitted. **Recommended Wilderness Areas DC:** Wilderness provides opportunities for nonmotorized and nonmechanized primitive and unconfined recreation and contiguous wildlife habitat. Human encounters are only with individuals or small parties, are infrequent, and opportunities for solitude are common.

Species or Species Group	Characteristic at risk	Potential Management Threats	Plan Components Which Address Risks to Species Viability
Providing additional protection for federally listed species, Region 3 sensitive species, migratory birds, or raptors not covered in the above categories	Loss of habitat components.	Logging, fuel management.	**Ponderosa Pine DC:** *Fine-scale:* Where historically occurring, there are oak thickets with various diameter stems, and low-growing, shrubby oak. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species. *Landscape:* Where it naturally occurs, Gambel oak is present with all age classes represented. It is reproducing and maintaining or expanding its presence within its natural range. **Forestry and Forest Projects GD:** Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan. **Mineral and Mining Activities DC:** Mineral and mining activities meet the legal mandates to facilitate the development of minerals on the forest in a manner that minimizes adverse impacts to surface and groundwater resources, and that do not prevent meeting other desired conditions applicable to the area. **GD:** Surface use should be restricted or prohibited in areas with habitat for threatened, endangered, and sensitive plant and animal species, and for heritage resources nominated or posted to the National Register. Use and occupancy should be restricted yearlong in areas supporting populations of threatened, endangered, and sensitive plant species. **Wild and Free Roaming Burro Territory DC:** A biologically sound and genetically viable burro population is in balance with native wildlife, permitted livestock, and other resource values. **GD:** Population control measures should be implemented to maintain genetic diversity and desired resource conditions in the area. **Kaibab Squirrel National Natural Landmark DC:** The Kaibab Squirrel National Natural Landmark provides quality ponderosa pine habitat for the Kaibab squirrel. **Bill Williams Mountain Management Area DC:** Bill Williams Mountain provides quality habitat for Arizona bugbane, Mexican spotted owls, and culturally important plants.

Appendix I. Management Indicator Species Selection

Introduction

This appendix outlines the Kaibab National Forest (NF) selection process and final candidates for management indicator species (MIS). The current planning rule requires that species shall be selected as MIS to estimate the effects of the planning alternatives on wildlife populations. MIS are selected because their population changes are believed to indicate the effects of management. They are used to evaluate alternatives by displaying the effects of the alternatives in terms of amount and quality of habitat and corresponding predicted changes to population trends.

It is recommended that an adequate but limited number of species be selected to reflect the major management issues and which can serve as effective metrics for monitoring the forest plan. It is not necessary to represent every dominant vegetation type, activity, or management issue. The Kaibab NF four priority "needs for change" identified during the Comprehensive Evaluation Report, guided the selection process: (1) modify stand structure and density toward reference conditions and restore historic fire regimes; (2) regenerate aspen to insure long-term healthy aspen populations; (3) restore natural waters and wetlands to insure healthy riparian communities; and (4) restore historic grasslands by reducing tree encroachment and restoring fire. The "needs for change" are the metrics that are used to help determine which MIS should be selected.

In identifying potential MIS, we considered the 1982 Planning Rule Provisions, 20 years of subsequent case law, and regional guidance. We also considered input from other forests, stakeholders, scientific literature, local research, and wildlife habitat models developed locally for the forest plan revision process. A topic discussion focused on species viability and the MIS selection process was also held for the public at the Rocky Mountain Research Station in June 2010. Participants included representatives from the Arizona Game and Fish Department, U.S. Fish and Wildlife Service, Sierra Club, Nature Conservancy, Coconino and Apache-Sitgreaves National Forests, and faculty from Northern Arizona University.

Management Indicator Species Selection Factors

The 1982 Rule Provisions include the following concepts:

- Each forest plan alternative must establish objectives that maintain and improve habitat for MIS;
- To estimate the effects of planning alternatives on fish and wildlife populations, certain vertebrate and/or invertebrate species shall be selected as MIS;
- These species are to be selected because their population changes are believed to indicate the effects of management; and
- Planning alternatives must be evaluated in terms of both amount and quality of habitat and of animal population trends of MIS.

There is no legal requirement to select an MIS for every activity, vegetation type, or management issue. Rather, MIS should be selected for those areas most likely to be affected by management. There is a legal requirement, however, to establish plan objectives for the maintenance and improvement of habitat for the MIS that have been selected.

The 1982 Rule Provisions at section 219.19(a)(1) direct that several categories of species shall be considered (though not necessarily included) for MIS status:

- Endangered and threatened plant and animal species identified on State and Federal lists;
- Species commonly hunted, fished, or trapped;
- Nongame species of special interest;
- Species with special habitat needs that may be influenced significantly by planned management programs (preferred); and
- Additional plant or animal species selected because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities or on water quality (no scientific basis for this).

The first three categories must be considered. However, frequently they are not the best choice because they are either difficult to survey and/or collect population trend data (e.g., sensitive species), they are not directly tied to a habitat type (e.g., forest generalists), or may be affected by factors other than forest-level management (e.g., habitat effects on the wintering grounds for long-distance migrants).

Species That Make Good Management Indicator Species

- Common species with high site fidelity and strong associations with particular habitat types and or vegetation structural or compositional attributes;
- Species that demonstrate a strong and/or predictable response to management activities against a background of environmental variability;
- Species for which population data is readily available or easy to obtain: the subject of existing monitoring programs (e.g., some bird species), species monitored by other entities (e.g., State wildlife agency census data), etc.; and/or
- Species with stable or increasing population trends.

Species That Make Poor Management Indicator Species

- Species for which monitoring protocols do not already exist;
- Species that exhibit variable response to forest management;
- Species that are difficult to detect or survey;
- Rare species or species with high variability of interannual abundance;
- Species with declining population trends; and/or
- Species populations that are influenced by factors outside forest management control.

While there are many species worthy of monitoring, species that cannot be effectively and accurately monitored at appropriate spatial and temporal scales with available resources, and/or that occupy an area not wholly representative of the planning unit, have limited if any utility for relating population level changes to habitat management and the subsequent integration of such results into the adaptive management feedback loop. These species are not well served as MIS.

Federally and State listed endangered and threatened plant and animal species that occur in the planning area were considered. However, because of their rarity in terms of population numbers and/or limited spatial extent on the forest and/or difficulties in collecting statistically sound data within appropriate temporal scales, no threatened or endangered species were found to be effective in terms of evaluating differences across management alternatives in the planning area.

**See Table I 2 for "Species considered but not selected as MIS."

Management Indicator Species Selection Results and Rationale

Based on complimentary lines of evidence, the priority needs for change, proposed action, and plan alternatives, the Kaibab NF identified four MIS believed to serve as strong indicators of management. These species also represent those vegetation types which have the greatest risk to species viability, as discussed in the Wildlife Effects Analysis in chapter 3 of the forest plan revision FEIS (KNF 2013).

These species meet the recommended criteria and would be relatively cost efficient to monitor and analyze. In addition to meeting the requirements for MIS, we believe these species would also serve as good "focal species" candidates under the 2012 Planning Rule. Focal species are defined as "a small subset of species whose status permits inference to the integrity of the larger ecological system to which it belongs and provides meaningful information regarding the effectiveness of the plan in maintaining or restoring the ecological conditions...." Although this analysis was conducted under the 1982 Planning Rule, current policy requires the revised plan be compliant with the new (2012) Planning Rule within 4 years. In an effort to streamline this process, the plan alternatives were developed proactively and considered many of the key components, such as MIS that would also serve as good focal species, outlined under the new planning rule. The results of our MIS analysis are summarized below.

Table I 1. Species proposed for new management indicator species for plan revision

Species	What They Indicate	Priority Need for Change
Grace's warbler (*Setophaga graciae*)	Clumps of mature ponderosa pine/pine-oak forests, yellow pine (parklike environments, such as reference condition)	Modify stand structure and density toward reference conditions and restore historic fire regimes.
Western bluebird (*Sialia mexicana*)	Understory development within openings in ponderosa pine stands	Modify stand structure and density toward reference conditions and restore historic fire regimes.
Ruby-crowned kinglet (*Regulus calendula*)	Mixed conifer (frequent fire) mature forest, overstory.	Modify stand structure and density toward reference conditions and restore historic fire regimes.
Pronghorn (*Antilocapra americana*)	Grasslands	Restore historic grasslands by reducing tree encroachment and restoring fire.

Need for Change 1: Modify stand structure and density toward reference conditions and restore historic fire regimes (ponderosa pine).

Grace's warbler is a neotropical migrant and breeding resident in ponderosa pine forest across all three ranger districts on the Kaibab NF (Birek et al. 2010). It is strongly associated with forest structure having well-developed canopy and pine-oak forest indicative of the open park-like conditions found historically in northern Arizona (Szaro and Balda 1986, Stacier and Guzy 2002, Saab et al. 2007, Kalies et al. 2010). Occupancy models developed for the forest plan revision process further demonstrate the strong association this species has with ponderosa pine-oak habitat, including structural variables such as basal area, canopy cover, and density (Dickson et al. 2011), likely to be affected by forest treatments. Local research has also demonstrated a strong response to fire by this species (Chambers and Kalies 2011). A return to presettlement (defined as prior to 1890) conditions should have a positive influence on population trends for this species. This species would allow the forest to assess overstory management by assessing its response to fuel treatments and fire management goals. Grace's warbler is a USFWS Species of Conservation Concern; there has been stakeholder interest in monitoring this particular species (K. Crumbo pers. comm. 2010).

Adequate ground cover—including the presence of fine fuels—is integral to maintaining the kind of low-intensity fires characteristic of presettlement conditions. Therefore, it is also necessary to evaluate the post-restoration understory response to overstory removal in ponderosa pine forests. Western bluebird, a ground-foraging species which depends largely on the understory for capture of invertebrate prey, has shown a strong response to burning and thinning in ponderosa pine forest (Wightman and Germaine 2006, Hurteau et al. 2008, Guinan et al. 2008, Russell et al. 2009, Dickson et al. 2009, Chambers and Kalies 2011). Wightman and Germaine (2006) found that western bluebird productivity and nest success were significantly affected by tree density (ponderosa pine and gambel oak) and adequate ground cover (grasses, forbs, and bare ground combined total of at *least* 20 percent). Occupancy models have further demonstrated a strong relationship of bluebirds with ponderosa pine forest and canopy cover of less than or equal to 35 percent (Dickson et al. 2011). A resident species, western bluebirds can be found forestwide.

Need for Change 1: Modify stand structure and density toward reference conditions and restore historic fire regimes (frequent fire mixed conifer).

Ruby-crowned kinglets are also a year-round resident that occupy mature, well developed mixed coniferous forest (Corman-Gervais 2005). This species may be sensitive to forest logging and wildfire (Swanson et al. 2008). Occupancy model results developed locally for this species show a strong association with mixed conifer forest (Dickson et al. 2011).

Need for Change 4: Restore historic grasslands by reducing tree encroachment and restoring fire.

Pronghorn are associated with grasslands and savannahs with scattered shrubs and rolling hills. They prefer forbs and grasses as forage, but will eat woody browse when forbs and grasses are not available (O'Gara and Yoakum 2004, Brown and Ockenfels 2007). Pronghorn are also important for economic and social reasons. Pronghorn should respond positively to increased habitat availability as a result of grassland restoration and improved connectivity because they are sensitive to crossing hard barriers (e.g., fence lines, I-40). Positive response have been predicted

from implementing the proposed revised plan has already been demonstrated through wildlife habitat models developed in collaboration with The Nature Conservancy (Hurteau 2010).

Strategy for Monitoring Management Indicator Species

Songbirds are relatively easy to survey because data can be collected on many species at one time without additional effort. Forestwide breeding bird surveys have been conducted on the Kaibab NF by the forest and Rocky Mountain Bird Observatory since 2005. Survey data are analyzed using widely accepted statistical methods. Under the existing sample design, it is possible to detect an average annual population change of 3 percent within 15 to 30 years, a change which could trigger listing under the Endangered Species Act for some birds. The methodology yields robust and statistically sound density estimates for the proposed MIS species, as well as other bird species of interest. Existing breeding bird survey data suggest a stable to increasing trend for all three bird species across the forest (Birek et al. 2010). This data serve as a solid baseline for future analyses and help to evaluate consequences across all planning alternatives. Spatially explicit occupancy models developed for these species should further assist with analyses of planning alternatives by incorporating information on environmental correlates in a statistically valid manner (Dickson et al. 2011).

Further, existing land bird survey methodology also incorporates data collection on fine scale vegetation variables at each point count station. These data can be incorporated into species habitat models to discern which predictor variables are most tightly linked to each MIS species. Forest Service projects hope to concurrently collect data on these same variables to ascertain how well projects are meeting the needs of these species over time. Annual monitoring and evaluation and reporting on at least a 5-year interval should allow the forest to reasonably assess if any management changes are warranted.

The Arizona Game and Fish Department is already monitoring and tracking population trend data for pronghorn on the Kaibab NF; the Kaibab NF would use those data to assess population trends and relate it to habitat.

Ecological Indicators

While MIS are to be selected to reflect major management issues (needs for change), MIS are not always the best approach to evaluate management. We believe that the other two of the needs for change—aspen and natural waters—would be better served by "ecological indicators." Ecological indicators are plants or animal species, communities, or special habitats that have a narrow range or ecological tolerance that are part of the monitoring plan. They differ from MIS in that there is no requirement to estimate population trends, rather a number of different parameters can be assessed to evaluate management.

Need for Change 2: Regenerate aspen to insure long-term healthy aspen populations.

Aspen stands are typically moister and richer in flora and fauna than their coniferous counterparts, and are an integral component of southwestern forests. In fact, aspen acts as a keystone species in the sense that its removal or addition may have significant impacts on community composition and structure. Second only to riparian systems in terms of biodiversity,

loss of aspen represents a loss of diversity in the forest that affects numerous wildlife species, plants, and abiotic processes (Campbell and Bartos 2001). Aspen is also important for economic and social reasons. The proposed plan details specific objectives for aspen; however, because aspen has a declining trend and the primary factors affecting aspen health are outside of Forest Service control, aspen was not considered a good MIS. We propose monitoring aspen directly as an ecological indicator with questions focused on regeneration, extent, and mortality.

Monitoring Strategy for Aspen

Fencing and ungulate removal should allow aspen to regenerate and facilitate long-term restoration. The forest monitoring plan has a specific question related to aspen regeneration and establishment which should provide information on the effectiveness of restoration efforts. The Kaibab NF already dedicates some resources to aspen monitoring, primarily on the Williams Ranger District, and peer-reviewed protocols for sampling aspen exist (USDA Forest Service 2004, Jones et al. 2005). Aspen on the North Kaibab Ranger District is abundant enough to be tracked through the Forest Service's existing Forest Inventory and Analysis program (http://www.fia.fs.fed.us).

Need for Change 3: Restore natural waters and wetlands to insure healthy riparian communities

Natural waters and wetlands emerged as key needs for change in the analysis of the management situation because the value of Kaibab NF waters is disproportionately greater than the area they represent. As oases across a primarily arid landscape, these features are extremely valuable to flora and fauna and provide important recreational, cultural, and economic benefit.

Springs and wetlands are highly variable depending on available water, elevation, soils, and other site factors. There is no single terrestrial or aquatic species common enough or cost-effective enough to serve as a good MIS. There are instead a suite of indicators that indicate healthy (water quality) or disturbed (nonnative invasive) aquatic ecosystems.

For example, riparian obligate plant species have a narrow range of ecological tolerance; in addition, they are resilient with good ability to reflect management consequences (USDI 2001). As an ecological indicator, a suite of parameters such as plant and invertebrate diversity—as well as healthy soil and water conditions—could be gathered during rapid on-the-ground assessments. Also, nonnative species (contraindicants) which cannot be used under MIS guidelines can be used as an ecological indicator to evaluate the effects of management alternatives. Nonnative species respond readily to ground-disturbing events (Ringold et al. 2008).

Monitoring Strategy for Natural Waters

The Kaibab NF has already conducted two cycles of wetland surveys since 1990, and has baseline trend data for this resource. In addition, the forest has entered into an agreement with the Museum of Northern Arizona to conduct an inventory and assessment of springs, which will be managed in a user-friendly database. This inventory would provide a baseline for future survey work, monitoring, and trend analysis. Improved spring and wetland habitat should be visible over time as the new plan is implemented and the effects of ground disturbance by humans and/or ungulates are abated. Additionally the forest monitoring plan contains questions related to the functional condition of lakes and wetlands and the restoration effectiveness of springs and wetlands.

Table I 2. Species considered but not selected as management indicator species

Species or Group	Taxa	Habitat[a]	Need for Change[b]	T & E	Existing MIS	Other[c]	Screening Rationale
Mexican spotted owl (*Strix occidentalis lucida*)	Bird	Late-seral mixed conifer and spruce-fir, canyons	1	X	X		Species is not well distributed in the planning area. Limited to seven protected activity centers on the Williams Ranger District. Difficult to assess population trends and relate to habitat changes and assess differences between management alternatives.
Apache trout (*Oncorhynchus apache*)	Fish	Water	3	X			Species is not well distributed in the planning area. Limited to one perennial stream (North Canyon Creek) on the North Kaibab Ranger District.
California condor (*Gynmogyps californianus*)	Bird	Open areas for foraging, cliffs and rocky areas for nesting.	NA	X		X	Species not directly tied to any one habitat type or priority need for change. Availability of rocks/cliffs and carrion more of a factor. Experimental (10j) population.
Northern goshawk (*Accipiter gentilis*)	Bird	Late-seral ponderosa pine	1		X	X	Difficult to effectively assess population trends. Population fluctuations may be more closely tied to variable weather conditions and the interrelated response by the species' mammalian prey base. Habitat generalist.
Pygmy nuthatch (*Sitia pygmaea*)	Bird	Late-seral ponderosa pine, snags	1		X	X	Fairly ubiquitous and not as closely tied to forest structure as Grace's warbler. Snags will be monitored directly in revised LMP monitoring plan.
Hairy wood-pecker (*Picoides villosus*)	Bird	Snags (pine, mixed conifer, spruce-fir)	1		X		Ubiquitous species, responds to disturbance and subsequent insect irruptions and availability of snags. Snags will be monitored directly in revised LMP monitoring plan.
Northern flicker (*Colaptes auratus*)	Bird	Openings, savanna, snags, and woody debris.	1			X	Not tied closely enough to habitat type. Some suggestion that the species seems to be on the decline; however, reasons are unknown and some may not be related at all to forest management (e.g., pesticides).
Mountain chickadee (*Poecile gambeli*)	Bird	Mature forest in mixed conifer and ponderosa pine, snags.	1			X	Response to forest treatments has been variable, not a clear pattern in the literature.

Table I 2. Species considered but not selected as management indicator species

Species or Group	Taxa	Habitat[a]	Need for Change[b]	T & E	Existing MIS	Other[c]	Screening Rationale
Olive-sided flycatcher *(Contopus cooperi)*	Bird	Mixed conifer and spruce-fir forest, snags and woody debris.	1			X	Long-distance migrant. Dichotomy exists between favorable response to forest treatments and overall population decline that could be linked to other factors such as deforestation on the wintering grounds.
Vesper sparrow (*Pooecetes gramineus*)	Bird	Grasslands, sagebrush shrublands	4			X	Existing population trend data for this species is lacking.
Gray vireo (*Vireo vicinior*)	Bird	Pinyon-juniper communities,	4			X	Existing population trend data on the Kaibab NF for this species is lacking. No differences between alternatives or objectives developed for pinyon-juniper.
Pinyon jay (*Gymnorhinus cyanocephalus*)	Bird	Pinyon-juniper communities	NA			X	No differences between alternatives or objectives developed for pinyon-juniper.
Virginia's warbler (*Oreothlypis virginiae*)	Bird	Pine-oak and pinyon-juniper, understory	1			X	Lack density estimates for baseline or trend. Management concern on wintering grounds in Mexico a possible confounding factor.
Black-throated gray warbler (*Dendroica nigrescens*)	Bird	Pinyon-juniper and pine-oak forest.	1			X	Habitat generalist, not tied closely enough to habitat variables of interest to be an MIS. Existing density trends for the forest are in pinyon-juniper and there is no alternative for this habitat. Information on habitat-related population changes lacking at both local and regional scales.
Brown creeper (*Certhia americana*)	Bird	Snags, old growth.	1			X	Lack current density estimates for species on forest. Snags will be measured directly in new LMP.
Mogollon vole (*Microtus mexicanus*)	Mammal	Meadows, openings.	1, 3, 4			X	Current population trends for Arizona are inconclusive but suggest a decline. Lack conclusive baseline for the analyses. Small mammals subject to natural cyclic fluctuations in the short term which might not have anything to do with management.
Abert's squirrel (*Sciurus aberti*)	Mammal	Early seral ponderosa pine, canopy.	1		X	X	Difficult to monitor and estimate population trends. Wide interannual variations in population estimates which are a normal function of species life history make it difficult to assess management effects.

Table I 2. Species considered but not selected as management indicator species

Species or Group	Taxa	Habitat[a]	Need for Change[b]	T & E	Existing MIS	Other[c]	Screening Rationale
Cottontail rabbit (*Sylvilagus floridanus*)	Mammal	Ponderosa pine (openings, understory).	1			X	Species is readily adaptable to a wide variety of habitats; may not be sensitive enough to assess specific management actions. Hunting pressure can further confound response.
Mountain lion (*Puma concolor*)	Mammal	Varies widely. Includes canyons and rocky areas with dense understory.	1, 2, 3, 4			X	Not tied to any one habitat type or priority need for change. More an indicator of habitat connectivity/ fragmentation which is not a plan alternative. Difficult and costly to monitor.
Elk (*Cervis elaphus*)	Mammal	Early-seral ponderosa pine, mixed conifer, spruce-fir.	1, 2, 3, 4		X	X	Hunted species with high socioeconomic value and needs habitat connectivity; also considered a threat to aspen health. Population is stable and well distributed. Affected more by habitat connectivity and available forage than any one particular habitat type. Population trends reflect hunt success, not management effects on population.
Mule deer (*Odocoileus hemionus*)	Mammal	Early-seral aspen and pinyon-juniper.	1, 2, 3, 4		X	X	Species is demonstrably widespread and secure. Affected more by habitat connectivity (winter/summer range) and available forage. Population trends reflect hunt success, not management effects on population.
Western chorus frog (Pseudacris triseriata), northern leopard frog (*Rana pipiens*), red-spotted toad (*Bufo punctatus*), wood-house toad canyon tree frog (*Hyla arenicolor*)	Herp	Wet moist ground, water, emergent vegetation.	3			X	Difficult to assess population trends, species likely localized to specific sites and not well distributed throughout planning area. Better as an ecological indicator. Lack existing baseline trend data.
Butterflies	Invert	Understory herbaceous cover.	1, 2, 3, 4			X	Response varies by species, no one species can be singled out. Lack existing trend data. Better as an ecological indicator.

Table I 2. Species considered but not selected as management indicator species

Species or Group	Taxa	Habitat[a]	Need for Change[b]	T & E	Existing MIS	Other[c]	Screening Rationale
Beetles	Invert	Understory and overstory health.	1			X	Response varies by species, no one species can be singled out. Lack existing trend data. Sorting and identification can be laborious and requires taxonomic expertise. Better as an ecological indicator.
Cheatgrass (*Bromus tectorum*), Russian olive (*Elaeagnus angustifolia*), leafy spurge (*Euphorbia esula*), salt cedar (Tamarix ramosissima)	Plants	Invasive response to disturbance	1, 2, 3, 4			X	Contraindicants, not appropriate as MIS. Better as an ecological indicator.

[a] For existing MIS this includes habitat they represent in the current forest plan

[b] Priority needs for change under the proposed plan: 1) Restore Fire Adapted Ecosystems 2) Protect and regenerate aspen 3) Restore natural waters and wetlands 4) Restore historic grasslands

[c] Additional species of interest brought up internally and/or externally

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Appendix J. Use of the "Best Available Science" for Wildlife in the Forest Plan Revision Process

Introduction

Wildlife biologists consulted with a variety of resources during the Kaibab National (NF) forest plan revision process. From development of the initial forest planning species list to writing plan components, monitoring approaches, and analyzing the effects of forest planning alternatives on species viability, the "Best Available Science" was consulted and used to ensure wildlife species would be afforded the best protection possible under the proposed action. Although not an exhaustive list, some of the more prominent sources are described in detail below.

Literature

The Forest Service maintains access to two separate but associated online libraries. The National Agricultural Library is one of four national libraries of the United States. It houses one of the world's largest and most accessible agricultural information collections and serves as the nexus for a national network of state land grant and U.S. Department of Agriculture field libraries: http://www.nal.usda.gov/. Within this context, the National Forest Service Library provides information services, access to e-journals and bibliographic databases, current literature alerting services, and a full range of document delivery and interlibrary loan services to Forest Service employees: http://www.fs.fed.us/library/.

Using these resources, Forest Service biologists consulted with premier journals during all phases of the plan revision process, namely the development of fine-scale plan components for wildlife species, summarizing the effects analyses for species viability, and development of the proposed management indicator species list. Top journals referenced included: *Science*, *Nature*, *Ecology*, *Forest Science*, *Ecological Restoration*, *Biological Conservation*, *Journal of Wildlife Management*, *Conservation Biology*, *Frontiers in Ecology and the Environment*, *the Condor*, and the *Birds of North America online*, among others. These journals support the wildlife analyses by providing timely and relevant results, peer-reviewed data on emerging trends, and high impact articles and conference proceedings.

Wildlife biologists also consulted with lesser known documents including non-published "gray literature" such as technical reports, white papers, internal reports, theses, systematic reviews, and meta-analyses. Many of these documents are maintained through the Rocky Mountain Research Station library and locally based academic institutions, including the Forestry Department and Ecological Restoration Institute at Northern Arizona University.

Databases and Data Management Systems

NatureServe, a nonprofit conservation organization whose mission is to provide the scientific basis for effective conservation action was consulted largely during development of the "forest planning species" list. This list provided the foundation for the forest's viability analysis and helped to focus plan components as needed.

NatureServe and its network of natural heritage programs are the leading source for information about rare and endangered species and threatened ecosystems. NatureServe represents an international network of biological inventories—known as natural heritage programs or

conservation data centers—operating in all 50 U.S. states, Canada, Latin America, and the Caribbean. Detailed information is collected and managed on plants, animals, and ecosystems. Information products, data management tools, and conservation services are also developed to help meet local, national, and global conservation needs. The objective scientific information about species and ecosystems developed by NatureServe is used by all sectors of society—conservation groups, government agencies, corporations, academia, and the public—to make informed decisions about managing our natural resources. More information on NatureServe can be found here: http://www.natureserve.org/.

Additionally, databases and species lists managed by the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department were consulted regarding threatened, endangered, and sensitive species as well as other local species of concern (e.g., narrow endemics and/or species likely to be affected by local processes).

The Heritage Database Management System (HDMS) managed by the Arizona Game and Fish Department, is part of a global network of more than 80 natural heritage programs and conservation data centers. HDMS information allows managers, stakeholders, and decision makers to make prudent decisions weighing future development, economic growth, and environmental integrity by identifying elements of concern in Arizona. The system consolidates information about wildlife species distribution and status throughout the State. This includes, but is not limited to, plants and animals with special status at the Federal, tribal, or State level, or specific habitat(s) necessary for their survival. Information included in the HDMS comes from published and unpublished reports, data collected by cooperating agencies, museum and herbarium collections, the scientific and academic communities, and many other sources, generally opportunistic in nature. Data managed under the HDMS is site-specific in nature, and appropriate for project level planning. As such, these data help Forest Service biologists develop forest planning guidelines. In addition to HDMS species, biologists also considered species listed under the State Wildlife Action Plan (SWAP) for helping to develop desired conditions and guidelines. SWAP species consist of species of greatest concern (SGCN) or species of economic and recreation importance (SERI). The SWAP also developed range maps for these species using wildlife models that broadly represent where a species habitat exists, and where the species itself may occur. Although all features of the SWAP mapping tools are not currently available to the public, Forest Service biologists obtained draft species list from Arizona Game and Fish biologists for reference during the plan revision process.

More information on these species lists and planning tools can be found here: http://www.azgfd.gov/w_c/edits/species_concern.shtml, http://www.azgfd.gov/w_c/cwcs.shtml, http://www.fws.gov/southwest/

Contemporary Modeling Tools and Approaches

In collaboration with local researchers and scientists, Kaibab NF biologists developed and used several wildlife-related habitat models to help assess the suitability of proposed management indicator species and to set a “baseline” for future monitoring. Further, these tools provide the forest with an empirically based platform for assessing wildlife habitat and species population change over time under each planning alternative, and provide a basis for refining future management.

The models, described in more detail below, incorporate the most current vegetation structural data based on remotely sensed and plot level data, with population data on density, occupancy, and/or movement patterns for select wildlife species.

- **Vegetation Dynamic Development Tool (VDDT):** The Vegetation Dynamics Development Tool (VDDT) is a Windows-based computer tool which provides a state and transition landscape modeling framework for examining the role of various disturbance agents and management actions in vegetation change. It allows users to create and test descriptions of vegetation dynamics, simulating them at the landscape level. Projecting changes in vegetation structure and composition over time is an important part of landscape level analyses, and VDDT model runs were foundational to the Kaibab NF plan revision process. Vegetation may change for a variety of reasons, such as human activity, fires, insects, pathogens, mammals, weather, or growth and competition. The interaction of these factors is complex and the combined effects are difficult to predict over long periods. VDDT provides a common platform for specialists from different disciplines (e.g., fire ecology, silviculture, wildlife biology) to collectively define the roles of various processes and agents of change on landscape level vegetation dynamics. The model runs allowed specialists from different resource areas on the planning team to evaluate how the on-the-ground changes to vegetation likely to occur from implementation of the different planning alternatives might affect their resource area. Specifically, wildlife biologists used VDDT model runs to assess availability of habitat for certain species of interest (e.g., threatened and endangered species, forest planning species, management indicator species and other species of concern) under the different planning alternatives.
- **Ripley's K:** The Ripley's K spatial test is a tool that can be used to quantify the spatial arrangement of trees across the landscape. As treatments include more structural heterogeneity at various scales, this statistical test should help the forest achieve desired conditions by allowing the Kaibab NF to verify if the forest structure outlined in the thinning prescription was achieved on-the-ground (i.e., are prescriptions implemented as planned?). To examine tree aggregation patterns, a quantitative assessment of the resulting structure retained after thinning treatments was compared to historic range of variability by using the Ripley's K function. This function statistically analyzes spatial patterns between pairs of points and tests the degree to which the remaining trees were spatially aggregated to determine whether or not treatments result in an evenly spaced, random, or aggregated (clumpy) forest structure. This helps to inform what changes need to be made in future forest treatments to meet objectives for restoring historic forest structure on the forest. This information could be used for a variety of wildlife species over time.
- **PatchMorph:** Vegetation structural characteristics and composition are frequently used to define wildlife habitat needs. A few of the metrics used to examine wildlife habitat include spatial heterogeneity, structural diversity, and vegetation temporal dynamics. Variation in these metrics across the landscape, in patches of optimal, suboptimal, and deficient habitat, are what allows species to coexist and be sustainable over time. A patch delineation algorithm called PatchMorph (Evan Girvetz; http://arcscripts.esri.com) was used to characterize functionally connected habitat for two focal species (Abert's squirrel and pronghorn) likely to be affected by increased rates of forest restoration treatments in ponderosa pine and grassland habitat types. The PatchMorph algorithm allows for the use of natural history characteristics specific to the focal species of interest to inform the

threshold values for habitat suitability, habitat gaps, and habitat spurs on the landscape. This tool helped Kaibab NF wildlife biologists to assess how effectively focal species are moving across the landscape under the current forest plan, and how those patterns might change under the planning alternatives. These tools could be applied to additional species in the future, depending on management needs.

- **Occupancy and Population Trend Models:** Spatially explicit occupancy modeling techniques were used in a monitoring context to estimate the current state (e.g., proportion of area occupied) of select management indicator species (Grace’s warbler, western bluebird, and ruby-crowned kinglet) and provide information on trends. These methods allow managers to make inferences about the effects of habitat change (both natural and human-caused) as it relates to population change over time. Occupancy models were developed to: (1) evaluate the suitability of the three management indicator species; (2) establish baseline trend estimates for future management indicator species monitoring and analyses; and (3) incorporate adaptive management into the Kaibab NF monitoring process and subsequent management decisions. An information theoretic approach was used to find the “best fit” model for each species. The models also provide a basis for adaptive management. As projects are implemented, post-treatment data can be collected on forest structural variables to assess how well management prescriptions meet the needs of these species over time. More information on wildlife habitat modeling tools for management can be found at http://www.cefns.nau.edu/seses/llecb/
- The Arizona Game and Fish Department began a new process for determining population trends for pronghorn in 2010. Trends are determined using population models based on inputs on harvest, male-female ratios, and young-female ratios, estimated mean mortality rates, and estimated starting populations. The best model is estimated by changing mortality rates of the starting population so that the predicted male-female ratios from the models for each year match those that are based on surveys. These data were referenced for estimates of pronghorn during the management indicator species analysis process and set a baseline for future trend monitoring.
- Finally, managing wildlife and wildlife habitat under an uncertain climate was expressly considered during evaluation of the different planning alternatives, and for developing plan components and/or management approaches. Biologists referenced the literature, as well as innovative tools such as a System for Assessing Vulnerability of Species (SAVS), a decision support tool for assessing wildlife vulnerability to climate change during project level planning. For more information on this application, see: http://www.fs.fed.us/rm/grassland-shrubland-desert/products/species-vulnerability/

Scientific Conferences, Workshops, and Collaborations

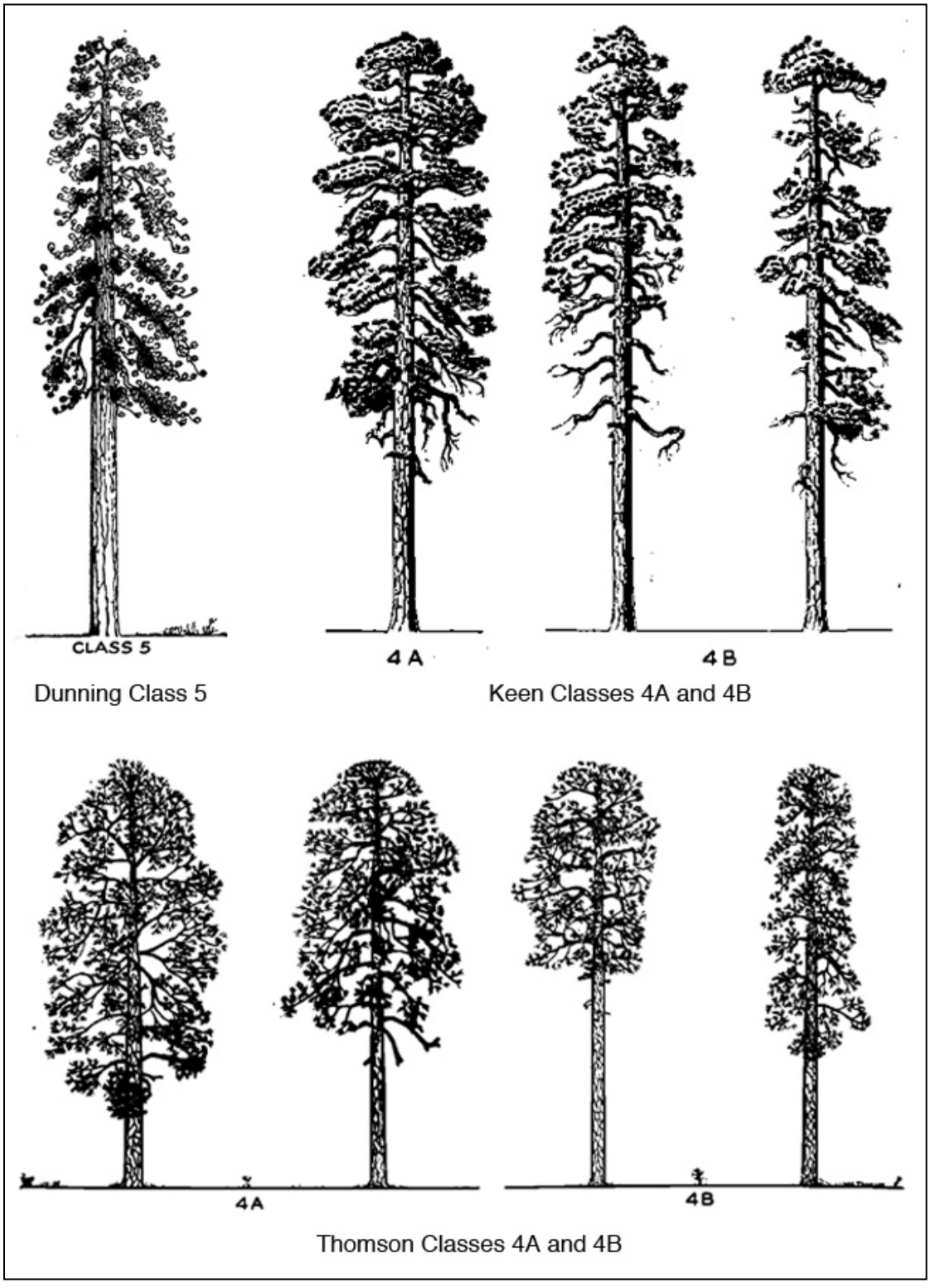
Forest Service biologists and planners attended and made contributions to several scientific conferences and workshops during the forest plan revision process including:

- Flagstaff Climate Change Adaptation Workshop
- 2010 Society of American Foresters Conference
- National Workshop on Climate and Forests: Planning Tools and Perspectives on Adaptation and Mitigation Options.

- The 11th Biennial Conference of Research on the Colorado Plateau: “Cultural and Natural Resource Management on the Colorado Plateau: Science and Management at the Landscape Scale”
- Society for Conservation Biology North American Conference for Conservation Biology. Bridging the Gap: Connecting People, Nature and Climate. Oakland, CA.
- The 12th Biennial Conference of Science and Management on the Colorado Plateau: “Effects of Rapid Climatic, Social, and Technological Changes on the Colorado Plateau”

The Kaibab NF sponsored two locally based workshops related to monitoring and the wildlife viability and management indicator selection process. Ecologists and biologists from other Federal agencies, nonprofit organizations, and academia were among the attendees representing a wide range of expertise in the fields of forestry, fire, restoration, wildlife, and spatial ecology, among others. Recommendations from these collaborations were integrated into various aspects of the draft forest plan and/or wildlife viability analysis. Kaibab NF wildlife biologists also engaged in several locally held “collaborwriting” sessions focused on group and public involvement. Plan content was developed in conjunction with this process which involved a variety of “expert” representatives from local stakeholder groups, academia, and other agencies.

Appendix K. Large Tree Retention Classes for Ponderosa Pine



Age Class Descriptions

Dunning (1928) Age Class 5: Overmature; usually largest trees in stand; bark light yellow with wide, long and smooth plates; tops flat with terminals rarely discernible; nearly all branches are drooping, gnarled, and crooked.

Keen (1943) Age Class 4: Overmature; making no further height growth; diameter growth very slow; bark light yellow, uniform for entire bole (except in extreme top), with wide, long and smooth plates and often shallow fissures; tops usually flat or occasionally rounded or irregular; branches large, heavy, and often gnarled or crooked and mostly drooping except in extreme top.

Thomson (1940) Age Class 4: Mature-overmature; trees usually large; bark reddish-brown to yellow with wide, long and smooth plates; tops usually flat and making no further height growth; branches mostly large and drooping, gnarled or crooked.

References

Dunning, D. 1928. A tree classification for the selection forests of the Sierra Nevada. *Journal of Agricultural Research* 36(9): 755–771.

Keen, F.P. 1943. Ponderosa pine tree classes redefined. *Journal of Forestry* 41(4): 249–253.

Thomson, W.G. 1940. A growth rate classification of Southwestern ponderosa pine. *Journal of Forestry* 38(7): 547–553.

Appendix L. Collaboration and Coordination with Other Planning Efforts

Introduction

This appendix summarizes the collaboration and coordination efforts for the Kaibab National Forest (NF) plan revision. It describes how the Kaibab NF engaged with the public, stakeholders, tribes, and other agencies throughout this effort. The first section of the document, Collaboration and Public Involvement Effort, provides information on meetings, workshops, and process used for sharing information and obtaining input. The second section of this document, Coordination with Other Public Planning Effort, briefly displays the planning and land use policies on adjacent and overlapping lands and how the Kaibab NF took that guidance into consideration.

Collaboration and Public Involvement Effort

Recognizing that our partners and publics have valuable ideas, knowledge, opinions, and needs that can inform and improve management of the Kaibab NF, the planning team developed a public involvement plan designed to provide opportunities for meaningful dialogue and collaboration throughout the plan revision process. Synopses of the key collaborative processes are listed below.

2006 Public Meetings

Public involvement for the Kaibab NF plan revision began in the fall of 2006 under the direction of the 2005 Planning Rule with two sets of public meetings held in the surrounding communities (Williams, Flagstaff, North Kaibab, and Tusayan). Meetings jointly hosted with the Coconino National Forest were also held in Phoenix. The first set of meetings provided an overview of the plan revision process, and included facilitated small group sessions that focused on likes/vision/desired conditions and dislikes/needs for changes. The second set of meetings reported back on the content from the first set of meetings and then followed up with more specific questions to drill down to gain additional detail and insight.

2006 Agency Meetings

In November 2006, the Coconino and Kaibab NFs held a multiagency plan revision meeting. This was attended by the National Park Service, Arizona State Parks, Coconino County, Yavapai County, Fish and Wildlife Service, Arizona State Forestry, Arizona Game and Fish Department, city of Flagstaff, city of Sedona, and Babbitt Ranches. This meeting reviewed the public comment process to date and asked for information from each agency that would be helpful in the plan revision effort. The majority of participants asked to stay informed via agency briefings.

2007 Working Group Meetings

In an effort to obtain more targeted public participation related to evaluating sustainability and identifying management needs for change, working group meetings were held on species diversity, ecosystem diversity, social and economic sustainability, and special areas. All working group meetings were advertised and open to the public. Input received during the working group meetings was used to prepare the “Ecological Sustainability Report,” “Social and Economic Sustainability Report,” and “Comprehensive Evaluation Report.” These reports are all available on the Kaibab NF Web site at: *http://fs.usda.gov/goto/kaibab/plan_revision.*

In March of 2007, the 2005 Planning Rule was enjoined. While the forest was able to work internally on specific products, public meetings were put on hold until direction was provided about how forests were to continue with forest planning. The Southwestern Region decided to move forward in a "rule neutral" manner.

In January 2008, the Coconino and Kaibab NFs held a multiagency and public meeting to share how the forests intended to go forward in forest plan revision in a planning rule neutral manner. Public input was sought on the products to date, and how the forest should move into finalizing the first phase of revision. In the fall of 2008, a new planning rule was in place (2008 Rule) and the Kaibab NF, adjusted its planning process to ensure conformance.

In accordance with the 2008 Planning Rule, a notice of initiation to revise the Kaibab forest plan was published in the Federal Register and Arizona Daily Sun in April of 2009. Concurrently, the comprehensive evaluation report (CER) was made available to the public online and hard copy. The CER specified the management needs for change that would serve to focus the plan revision effort. The notice of intent initiated another round of public meetings as well as several efforts specifically designed to develop content for the plan and alternatives.

2009 Kaibab National Forest Health Focus

The Kaibab NF sponsored a series of science-based, collaborative meetings to prioritize treatment areas and provide guidance for forest restoration treatments for use in revising the Kaibab forest plan and guide future landscape level forest restoration efforts. The forest formed a partnership with Northern Arizona University's Lab of Landscape Ecology and Conservation Biology to host a collaborative forum on forest health supported by spatial modeling and analysis. The effort drew from, and expanded upon, previous collaborative assessments and analysis including the Western Mogollon Plateau Landscape Assessment, the Statewide Strategy for Restoring Arizona's Forests, and the Analysis of Small-diameter Wood Supply for Northern Arizona. The effort produced a series of recommendations used to develop desired conditions, objectives, and guidelines in the initial working draft plan. A detailed report can be accessed at *http://fs.usda.gov/goto/kaibab/plan_rev_docs*.

Following publication of the CER, but prior to the public meetings that were scheduled to follow, the 2008 Planning Rule was enjoined. A Federal District Court order issued in June 2009 reinstated the 2000 Planning Rule, which included transition provisions to revise plans under the earlier 1982 Rule (section 219.35). In an effort to maintain momentum and capitalize on the collaborative efforts and analysis to date, the Kaibab NF decided to continue with the plan revision effort under the provisions of the 1982 Rule.

2009 Public Meetings

Public meetings were held in Fredonia and Williams to share the needs for change and solicit input on possible wilderness, research natural areas, and wild and scenic river recommendations. Due to recent legal actions and subsequent changes to the plan revision process, the intent to proceed under the 82 Rule Provisions and its differing requirements were also a topic of discussion.

2009-2010 "Collaborwriting" Workshops

The Kaibab NF hosted five workshops for developing specific plan content for aspen, grasslands, springs, mixed conifer, and recreation. The workshops used a groupware tool called "collaborwriting" which served like an electronic flipchart onto which everyone could view and type comments at the same time. Facilitated follow up enabled exploring themes, seeking detail, and gaining clarification. This tool allowed for: (1) a lot of content to be captured in a short time; (2) the exact words and intent to be preserved; (3) the meeting content to be immediately available as it did not need to be transcribed; and (4) quieter participants to have an opportunity to express themselves and prevented more vocal participants from monopolizing.

In conjunction with the collaborwriting workshops, an online component shared the workshop content. The intent was to validate and build on the workshop content, but there was limited participation and it did not yield additional content. A final collaborwriting session was held following the comment period on the draft plan to address issues and develop alternatives.

Due to the complexity and also public interest in wildlife issues and monitoring/adaptive management, two additional workshops were held. Both of these workshops had participants from Arizona Game and Fish Department, U.S. Fish and Wildlife Service, environmental groups, academia, and other agency personnel.

2012 Draft plan and DEIS Roll-Out

Following publication of the NOA (Notice of Availability) in the Federal Register on April 20, 2012 announcing the availability of the DEIS and proposed plan, the planning team hosted public meetings in Williams and Fredonia, AZ. Presentations were given to the Williams City Council, Tusayan Town Council, Fredonia Town Council, Southwest Utah Planning Authorities Council, Cameron and Bodaway-Gap Navajo Chapters, livestock grazing permittees, and the Williams Rotary Club. Work sessions were held with the Grand Canyon National Park staff and the Kane County (UT) Commissioners to go over the plan and DEIS contents and discuss concerns. Meetings were also held with the Arizona Game and Fish Department, U.S. Fish and Wildlife Service, Kaibab Band of Paiute Indians, and Hopi Tribe to discuss comments.

Coordination with State, Federal and Local Governments

Coordination with State, Federal, and local governments occurred throughout the planning process. A majority of the coordination that resulted in substantive plan language was around topics of mutual interests such as wildlife management, potential wilderness areas, and managing across agency boundaries. More formal presentations and briefings were held with State, local and Federal elected officials including the city of Williams, town of Fredonia, town of Tusayan, Coconino County Board of Supervisors, and congressional representatives. The briefings and presentations focused on issues and key topics such as continued economic uses, access, and protections.

Tribal Meetings

Due to the level of use of the forest by tribal members and the unique interests of area tribes, the Kaibab NF conducted extensive tribal consultation and scoping of tribal communities throughout the forest plan revision process. This consultation process reflects a long-standing commitment

by the Kaibab NF to share the stewardship of public lands with area tribes. Throughout the plan revision process, tribal consultation was conducted at the government-to-government level with concerned tribes according to established memoranda of understanding and pertinent laws and regulations. Additionally, the forest scoped tribal communities and individual tribal members that use the forest. These efforts were made to assure that affected tribal publics were given the opportunity to participate in the planning process as required by the National Environmental Policy Act and other laws and regulations. In more than 30 face-to-face meetings, a wide range of concerns were raised related to almost every aspect of land management. The primary tribal concerns were about increased development on the forest, extractive undertakings such as uranium mining, and continued access to ceremonial sites and forest products for traditional and cultural purposes.

In August 2007, the Kaibab NF hosted the first of what has since been an annual intertribal meeting. . The first meeting was held specifically to discuss the forest plan revision and uranium mining. Subsequent meetings have continued to have forest planning as an agenda item; however the scope has become broader, and recently involved other agencies as well. The meetings have been attended by representatives of the Havasupai Tribe, Hopi Tribe, Hualapai Tribe Kaibab Band of Paiute Indians, Navajo Nation, Yavapai-Prescott Indian Tribe, Yavapai-Apache Nation, Zuni, and Tonto Apache Tribe.

Additionally, there were meetings and phone calls with various stakeholders upon request and as needed to discuss and clarify comments received and to provide information.

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
6/8/2006	Meeting with Governor's Oversight Council on Forest Health	Flagstaff, AZ
6/22/2006	Hopi Tribe and Hopi Cultural Resource Advisory Team (CRAT)	Kykotsmovi, AZ
7/6/2006	Kaibab Paiute Band of Indians Tribal Council	Pipe Springs, AZ
9/19/2006	1st round – public meeting	Williams, AZ
9/20/2006	1st round – public meeting	Flagstaff, AZ
9/21/2006	1st round – public meeting	Kanab, UT
9/22/2006	1st round – public meeting	Tusayan, AZ
10/7/2006	1st round – public meeting	Phoenix, AZ
10/12/2006	2nd round – public meeting	Kanab, UT
10/18/2006	2nd round – public meeting	Williams, AZ
10/19/2006	2nd round – public meeting	Flagstaff, AZ
10/20/2006	2nd round – public meeting	Tusayan, AZ
11/17/2006	Phoenix area Government meeting (joint w/Coconino)	Phoenix, AZ

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
11/18/2006	2nd round – public meeting (joint w/Coconino)	Phoenix, AZ
12/17/2006	Cameron Chapter Meeting of Western Navajo	Cameron, AZ
12/18/2006	Navajo Forestry Department	Fort Defiance, AZ
01/31/2007	Navajo Nation (joint meeting with Coconino National Forest)	Window Rock, AZ
02/05/2007	Havasupai Tribal Council	Tusayan, AZ
02/15/2007	Bodaway/Gap Chapter of Western Navajo	Gap, AZ
02/21/2007	Hopi Tribe	Kykotsmovi, AZ
03/11/2007	Coppermine Chapter of Western Navajo Agency	Red Mesa, AZ
05/30/2007	Navajo Nation	Window Rock, AZ
07/11/2007	Havasupai Tribe	Conference Call
08/07/2007	Multitribal Meeting	Williams, AZ
11/19/2007	Navajo Nation	Window Rock, AZ
12/18/2007	Field trip to Chuska Mountains w/Navajo Forestry	Navajo, AZ
12/19/2007	Hopi Natural Resources	Kykotsmovi, AZ
01/12/2008	Joint Meeting w/Coconino Multistakeholder	Flagstaff, AZ
01/28/2008	Kaibab Paiute Tribe	Fredonia, AZ
02/14/2008	Navajo Nation	Flagstaff, AZ
02/19/2008	Yavapai-Prescott Indian Tribe	Williams, AZ
02/20/2008	Hopi Tribe	Kykotsmovi, AZ
03/04/2008	Hualapai Tribal Chair and Staff	Peach Springs, AZ
03/18/2008	Havasupai Tribal Council	Tusayan, AZ
03/19/2008	Kaibab Paiute Tribe	Pipe Springs, AZ
04/22/2008	G&F Coordination Meeting	Flagstaff, AZ
05/01/2008	Bat Meeting at Arizona Game and Fish	Flagstaff, AZ
7/15/2008	Attend Navajo Natural Resources Conference	Flagstaff, AZ
09/02/2008	First Multitribe meeting	Williams, AZ
09/03/2008	Hopi Tribe, Kaibab Band of Paiute, Hualapai Tribe, Navajo Nation	Williams, AZ
11/05/2008	Attend Arizona Department of Transportation Statewide Transportation Meeting	Flagstaff, AZ

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
01/21/2009	Forest Health Focus – Meeting1	Flagstaff, AZ
02/18/2009	Forest Health Focus – Meeting 2	Flagstaff, AZ
04/28/2009	Forest Health Focus – Meeting 3	Flagstaff, AZ
06/2/2009	Forest Health Focus – Meeting 4	Flagstaff, AZ
08/26/2009	Public Meeting – Rollout of Comprehensive Evaluation Report	Williams, AZ
08/27/2009	Public Meeting – Rollout of Comprehensive Evaluation Report	Fredonia, AZ
09/03/2009	Triforest Leadership Meeting; Presentation to RF	Williams, AZ
09/28/2009	Multitribe Meeting	Williams, AZ
12/14/2009	Collaborwriting Workshop: Grasslands	Flagstaff, AZ
12/17/2009	Collaborwriting Workshops: Aspen and Springs	Flagstaff, AZ
01/19/2010	Collaborwriting Workshop: Recreation	Flagstaff, AZ
02/02/2010	Mixed Conifer Topic Meeting	Flagstaff, AZ
03/02/2010	USFWS Meeting	Flagstaff, AZ
03/04/2010	Pueblo of Zuni	Zuni, NM
03/10/2010	Hualapai Tribe	Peach Springs, AZ
03/12/2010	Navajo Nation	Window Rock, AZ
03/26/2010	Hopi Tribe (Hopi Vice Chairman and Other Hopi Staff)	Kykotsmovi, AZ
04/01/2010	Arizona Game and Fish Department Coordination Meeting	Flagstaff, AZ
04/06/2010	Havasupai-FPR Briefing for Council	Havasue, AZ
05/13/2010	Fredonia Public Meeting	Fredonia, AZ
06/07/2010	Kaibab-Paiute Community Meeting	Pipe Springs, AZ
06/15/2010	Wildlife Issues and Analysis Topic Meeting	Flagstaff, AZ
06/16/2010	Meeting with Arizona Coalition of Conservation Groups	Flagstaff, AZ
07/15/2010	Meet w/Wildlands Council	Flagstaff, AZ
7/29/2010	Collaborwriting Workshop: Issues and Alternatives Meeting	Flagstaff, AZ
8/3/2010	Meet w/Andi Rodgers (Arizona Game and Fish Department)	Flagstaff, AZ
8/24/2010	Monitoring and Adaptive Management Workshop	Williams, AZ
9/2/2010	Meet w/Alicyn Gitlin Sierra Club	Flagstaff, AZ
9/15/2010	Intertribal Meeting	Williams, AZ
09/21/2010	Attend Sierra Club “Meet and Greet”	Flagstaff, AZ

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
10/22/2010	Call with Wildlands Council (Kim Crumbo) re: Alternatives	Conference Call
10/27/2010	Attend Society of American Foresters, present poster on collaborwriting	Albuquerque, NM
11/21/2010	Conference Call with Sierra Club to Discuss Alternatives	Conference Call
01/13/2011	Meet w/Sierra Club	Flagstaff, AZ
02/15/2011	Yavapai-Prescott Indian Tribe	Prescott, AZ
02/16/2011	Hualapai Tribe	Peach Springs, AZ
02/23/2011	Pueblo of Zuni	Zuni, NM
02/24/2011	Meet w/ Fish and Wildlife Service	Flagstaff, AZ
02/24/2011	Navajo Nation	Window Rock, AZ
03/01/2011	Presentation to Williams Fire Advisory Council (WFAC)	Williams, AZ
03/9/2011	Havasupai Tribe	Flagstaff, AZ
03/14/2011	Presentation at Sierra Club Meeting	Flagstaff, AZ
03/23/2011	Hopi Tribe	Kykotsmovi, AZ
04/6/2011	Arizona Game and Fish Coordination	Flagstaff, AZ
04/26/2011	Coordination Meeting with Fish and Wildlife Service	Flagstaff, AZ
06/02/2011	Meet Arizona Game and Fish Department, discuss Viability/ MIS	Flagstaff, AZ
09/13/2011	Participate in Tribal Climate Change Workshop	Flagstaff, AZ
09/21/2011	Tusayan Town Council	Tusayan, AZ
09/22/2011	City of Williams Council	Williams, AZ
09/27/2011	Fredonia Town Council	Fredonia, AZ
10/05/2011	Briefing with Congressman Gosar's Staff	Washington, DC
100/6/2011	Briefing with Senator Kyl's Staff	Washington, DC
10/07/2011	Briefing with Senator McCain's Staff	Washington, DC
10/24/2011	Kaibab Forest Plan Related Posters/presentations Biennial Conference	Flagstaff, AZ
10/25/2011	Wildlands Council/Sierra Club (K. Crumbo, L. Nemeth, A. Gitlin)	Flagstaff, AZ
10/26/2011	Monitoring Workshop 4FRI Science & Monitoring group	Flagstaff, AZ
11/8/2011	Presentation to Southern Utah Planning Authorities Council	Kanab, UT
12/14/2011	Meet with County Supervisors Matt Ryan, Carl Taylor, Lena Fowler.	Flagstaff, AZ
01/19/2012	N. Arizona Chapter-Society of American Foresters, presentation	Flagstaff, AZ

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
03/26/2012	Attended round table discussion with Coconino NF and Rocky Mountain Reseach Station.	Flagstaff, AZ
04/04/2012	Annual coordination meeting with Arizona Game and Fish/U.S. Fish and Wildlife Service –presentation Q&A	Flagstaff, AZ
04/12/2012	Annual Range Permittee meeting-presentation Q&A	Williams, AZ
04/26/2012	City of Williams Council Meeting presentation Q&A	Willaims, AZ
05/02/2012	Briefing for Deputy Undersecretary of Agriculture, Butch Blazer	Tusayan, AZ
05/07/2012	Kanab County Commisioners, Working group meeting	Kanab, UT
05/07/2012	Public Meeting	Fredonia, AZ
05/09/2012	Intertribal Meeting	Pipe Springs, AZ
06/16/2012	Public Meeting	Williams AZ
05/20/2012	Cameron Chapter Meeting, Navajo Nation	Cameron, AZ
05/31/2012	Williams Rotary Club, presentation, Q&A	Williams, AZ
06/06/2012	Tusayan Town Council Meeting, presentation Q&A	Tusayan, AZ
06/12/2012	Fredonia Town Council Meeting, presentation Q&A	Fredonia, AZ
06/28/2012	Monitoring Workshop	Flagstaff, AZ
07/1020/12	Meeting with Grand Canyon National Park staff	Flagstaff, AZ
07/10/2012	Meeting with Sierra Club Chapter (to answer questions).	Flagstaff, AZ
09/06/2012	Council Meeting, Kaibab Band of Paiute	Pipe Springs, AZ
09/19/2013	Consultation Meeting with Hopi Tribe	Kykotsmovi, AZ
10/11/2012	Atttended Greater Grand Canyon Landscape Assessment Collaborative Meeting	Flagstaff, AZ
12/21/2012	Meeting/ Soltice potluck, Hopi Tribe	Kykotsmovi, AZ
04/05/2013	Northern Arizona Forest Policy class presentation	Flagstaff, AZ
04/15/2013	Forest plan update for Zuni and Hopi tribal elders	Kane Ranch, AZ
06/17/2013	Atttend Greater Grand Canyon Landscape Assessment Collaborative Technical Worksession	Flagstaff, AZ
08/21/2013	Deputy Undersecretary of Agriculture Butch Blazer, briefing	Washington, DC
08/21/2013	Meet with Senator Flake's Staff	Washington, DC
08/22/2013	Meet with Senator McCain's Staff	Washington, DC
08/22/203	Meet with Congresswoman Kirkpatrick's staff.	Washington, DC

Table L 1. Listing of key collaboration and public involvement meetings and discussions

Date	Meeting	Location
0827/2013	Undersecretary of Agriculture's Brief Chief of Staff	Washington, DC

Information Made Available to the Public on the Forest Plan Revision Web Site

Under the 2008 Planning Rule, three reports were prepared and released to the public: the Economic and Social Sustainability Assessment was released in August of 2008; the Ecological Sustainability Report was released in December 2008, and the Comprehensive Evaluation Report was released in April of 2009. These reports were made available at public meetings, on the Kaibab NF Web site, and by request. A notice of initiation was published in the Federal Register in April of 2009 announcing the availability of these reports, as well as the forest's intent to revise its forest plan based on identified needs for change.

To meet the requirements of the 1982 Planning Rule Provisions, an analysis of the management situation was prepared. Availability of the analysis of the management situation and the initial working draft plan was published in the Federal Register with a notice of intent on April 24, 2010.

Over a year and a half period, four iterations of the Kaibab working draft forest plan were posted to the Web site. While the official comment period was in the 2 months following release of the initial working draft plan, comments were received throughout the process that were used to modify and refine language in the working draft for the proposed plan and alternatives.

Following the Notice of Availability published to the Federal Register, The Draft Plan and DEIS were posted to the Kaibab website. Additionally, information was posted about how to comment, plan development, collaboration, and how we used the best available science, wilderness and wild and scenic river assessments, and specialist reports.

Coordination with Other Planning Efforts

Provisions of the 1982 Planning Rule state that the responsible line officer shall review the planning and land use policies of other Federal agencies, State and local agencies and governments, and American Indian tribes. In preparing the Kaibab forest plan, the planning team reviewed the objectives expressed and evaluated the interrelationships. For the most part, the proposed Kaibab forest plan compliments these other planning efforts. These plans, assessments, and strategies were considered in the development of plan components to ensure as much alignment as was practicable. Management approach sections of the plan articulate identified issues and opportunities for coordinating with various partners across administrative boundaries, particularly State, local, tribal, and Federal agencies. The primary concordances are in managing for safe and healthy vegetation conditions, protection of air and water quality, providing for quality core wildlife habitats with connectivity, and maintenance of high scenic values. Cross boundary issues include managing for wide ranging species and wildfire across agency

boundaries, and working together to improve efficiency. While there were some differences related to the differing missions, no conflicts requiring alternative development were identified.

Coordination has also been ongoing with the 4 Forest Restoration Initiative. The primary focus areas for coordination included topics about plan consistency, monitoring and adaptive management, where there is a high degree of overlap.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
State		
Arizona Forest Resource Strategy (2010)	Arizona State Forestry Division	This strategy: (1) outlines long-term coordinated approaches for addressing forest resource issues and opportunities in priority landscapes; (2) describes how the State proposes to invest Federal funding and other resources to address State, regional, and national forest management priorities; (3) identifies key partners and stakeholders for future program, agency, and partner coordination; (4) incorporates existing statewide plans including the State Wildlife Action Plan (SWAP) and community wildfire protection plans (CWPP); and (5) discusses the resources necessary for implementation. The goals include: (1) people and communities receive maximum benefits from forests and trees with minimized negative impacts to trees and forests; (2) resilient and diverse forest ecosystem structures, processes, and functions with progress toward landscape scale outcomes, restoration of unhealthy ecosystems, and enhanced sustainability with negative impacts; (3) improved water quality and quantity from forested watersheds, improved health and resiliency of forested aquatic systems (riparian areas, springs, and wet meadows); (4) increased public understanding of the importance of forests to Arizona's water quality and improved air quality; (5) wildland ecosystems where appropriate fire regimes maintain health and resiliency of natural vegetation, "Fire Adapted Communities" that provide shared stakeholder responsibility for healthy landscapes and wildfire prepared communities, enhanced wildland fire management capacity in Arizona, and an Arizona public and government leadership that is well informed about wildland fire, management, science, and prevention issues; (6) realized long-term economic potential of sustainable forest products and bioenergy (while achieving ecosystem health goals), protection of areas with economic development potential related to ecosystem services, community recognition of the economic importance to protecting healthy natural systems; (7) increased resilience of ecosystems to climate change, reduced rate of future climate change through maximized carbon sequestration in Arizona forests and trees, broad public and community understanding of climate change science–Arizona's variable climate and current and future impacts; and (8) improved communication between all land management agencies, indigenous tribes, and other cultural groups about varying perspectives and beliefs related to forests, trees, and other natural resources, effective collaboration mechanisms for sharing of information about resources, priorities, policies, and management strategies between tribes and nontribal organizations.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Governor's Forest Health Council Statewide Strategy for Restoring Arizona's Forests (2007 [Draft]).	Governor's Forest Health Oversight Council	This document describes approaches for achieving long-term ecosystem restoration, fire risk reduction around communities, natural fire management in wildlands, and the development of appropriate restoration related economic opportunities. Based on sound ecological and social science, the statewide strategy incorporates valuable insights and techniques from the successful and innovative efforts already underway in Arizona. The primary purpose of the statewide strategy is to foster the implementation of a comprehensive, systematic effort to restore the ecological integrity of Arizona's forests and woodlands, while at the same time describing how rural communities can benefit from their aesthetic, ecological, and economic resources without compromising forest health and public safety.
The State Long-Range Trans-portation Plan (2011)	Arizona Dept. of Trans-portation (ADOT)	ADOT's long-range plan identifies the following goals and objectives: Improve Mobility and Accessibility, Link Transportation and Land Use, Support Economic Development, Promote Natural, Cultural, and Environmental Resources, and Strengthen Partnerships. Key areas of concordance include safety, wildlife corridors, and collaborative approaches.
Statewide Comprehen-sive Outdoor Recreation Plan (SCORP) (2012 [Draft])	Arizona State Parks	The primary purpose of the SCORP is to: (1) establish outdoor recreation priorities for Arizona that will help outdoor recreation and natural resource managers at all levels of government, the State legislature, and the executive branch make decisions about the State's outdoor recreation sites, programs and infrastructure; (2) set evaluation criteria to allocate the Federal Land and Water Conservation Fund and local, regional and State Parks Heritage Fund grants consistent with the State's outdoor recreation priorities identified in this plan; (3) provide outdoor recreation managers with guidance and information to use for more specific recreation planning and budgeting; (4) encourage a better, highly integrated outdoor recreation system throughout Arizona that balances recreation and protection of natural and cultural resources; and (5) strengthen the awareness of the connections between outdoor recreation with health benefits and a thriving economy. Seven priority issues were identified, each with specific goals and strategies. These issues are: (1) secure sustainable funding; (2) improve collaborative planning and partnerships; (3) respond to the needs of special populations and changing demographics; (4) resolve conflicts; (5) secure access to public; (6) protect Arizona's natural and cultural resources; and (7) communicate with and educate the public.
Arizona Bat Conservation Strategic Plan (2003)	Arizona Game and Fish Dept.	Delineates specific areas of concern for management, research, inventory and monitoring, and education that should be addressed in Arizona by land managers, wildlife managers, and scientists. Provides consistency for bat conservation throughout the State.
Arizona Partners in Flight Bird Conservation Plan (1999)	Arizona Game and Fish Dept.	Identifies priority bird species and habitats, and establishes objectives for bird populations and habitats in Arizona. Focuses on microhabitat requirements of priority species, and also identifies landscape scale requirements. Conservation actions are recommended, and partnerships are identified to accomplish the objectives.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Arizona's Wildlife Linkages Assessment (2006)	Arizona Game and Fish Dept.	Helps to inform planners and engineers by providing suggestions for the incorporation of linkage zones into their management planning to address wildlife connectivity in the planning process. Helps to integrate considerations for wildlife connectivity into regional planning and projects early in the process, and provides increased opportunities to conserve wildlife movement.
The Coconino County Wildlife Connectivity Assessment: Report on Stakeholder input (2011)	Arizona Game and Fish Dept.	This report provides background information on the importance and benefits of conserving wildlife linkages for both people and wildlife in Coconino County, and describes the methods used in a series of stakeholder driven workshops. It includes a series of maps that depict the general locations of wildlife linkages and potential barriers to wildlife movement. The maps are followed by tables of descriptive information about the habitat areas each linkage connects, the species each linkage serves, and known threats and potential conservation opportunities associated with each linkage and barrier.
State Wildlife Action Plan (2012)	Arizona Game and Fish Dept.	The SWAP provides a framework for helping to set the State's wildlife conservation priorities. SWAP species consist of species of greatest concern (SGCN) or species of economic and recreation importance (SERI). HabiMap™ Arizona, a component of the SWAP, provides a visual representation of the Species and Habitat Conservation Guide, which includes more than 300 layers of wildlife data and other information to identify the conservation potential at a statewide level.
Arizona Statewide Proghorn Management Plan (2011)	Arizona Game and Fish Dept.	The objectives of this plan are to (1) identify all occupied or potential pronghorn habitat. Manage pronghorn populations under a herd unit or management unit basis; whichever best facilitates achievement of management objectives; (2) survey pronghorn populations using a standardized survey protocol that produces survey-generated population estimates. Estimate current populations within each pronghorn management area using population modeling in conjunction with surveygenerated population estimates; (3) use habitat and issue assessment to identify major issues and opportunities relative to pronghorn herd or management unit populations; (4) use the Guidelines for the 2012–2013 and 2013–2014 Hunting Seasons to direct annual hunt recommendations; (5) recommend management objectives and identify specific strategies for each pronghorn herd-management unit to address priority issues and opportunities; and (6) report on completed management actions.
Arizona National Forest Cave and Karst Management Plan (2013 draft)	Central Arizona Grotto	The purpose of this guide is to summarize Cave Management procedures used on the Arizona National Forest. Cave resources are both fragile and non-renewable and special considerations are required to provide resource protection and recreational opportunities.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
County		
Coconino County Comprehen-sive Plan. (2003)	Coconino County, Arizona	Improve forest health and promote the restoration of forest ecosystems. Manage recreational uses in a manner that minimizes impacts to communities and the environment. Concentrate development in designated growth areas while preserving open space and landscapes. Encourage residents of neighborhoods in wildland-urban interface areas to participate in forest planning, management, and restoration efforts. Coordinate planning and maintenance of recreational opportunities that minimize adverse impacts to natural systems and residential areas. Assist other agencies with the planning and development of designated OHV routes and educational information that addresses the needs and impacts of OHV uses. Coconino County supports Federal acquisition through exchange or purchase of private inholdings surrounded by national forest or BLM lands that are important habitat areas, that contain environmentally sensitive lands, or that would reduce fragmentation.
Yavapai County General Plan (2003).	Yavapai County, Arizona	Sustain Yavapai County's rural character. Preserve open lands and the county's attractive image. Maintain open space between communities, encourage continued ranching and livestock grazing, coordinate with land agencies sale/exchange proposals to recognize existing zoning and recreational opportunities, maintain clear air. Protect scenic views and mountain vistas. Enhance parks and recreational opportunities. Preserve existing trails for differentiated uses. Identify sites of scenic interest and practice visual conservation. Protect natural water resources. Maintain waterflow, ecosystems. Strive to reserve desirable public lands for recreation, open space, protection of wildlife habitats, and buffering residential areas. Connect open spaces with wildlife corridors and pronghorn grassland habitats, protect wildlife habitats, protect riparian areas, watercourses, and associated flood plains.
Yavapai County Comp-rehensive Plan (2012)	Yavapai County, Arizona	Revises the Yavapai County General Plan (2003). "The guiding vision for the Yavapai County Comprehensive Plan is to provide a flexible and adaptable approach to managing growth while respecting the values of our past, to achieve our common goals, and to plan for a future that enhances our high quality of life while protecting a permanently sustainable natural environment. Our vision is to protect the unique quality of life characteristics within each of Yavapai County's diverse communities, to preserve our Western rural and ranching traditions, and to responsibly manage the process of urbanizing communities, when desired, through sensible planned growth and the sustainable use of finite resources. This vision is a reflection of the shared desire to protect and enhance rural character; small town friendliness; abundant natural open spaces, public lands, and scenic vistas; and to ensure the compatibility between rural and urbanizing areas. To best serve a diverse population, our vision is to be flexible and adaptable to the wide variety of needs within the County's distinct regions."

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Kane County Resource Management Plan (2011)	Kane County, Utah	The major provisions in the resource management plan that guide Federal resource management coordination with State and local governments are: (1) preserve traditional multiple use/sustained yield management processes; (2) do not employ management prescriptions that parallel, duplicate, or resemble wilderness management without congressional designation of wilderness areas; (3) coordinate inventories for wilderness characteristics with state and local governments; (4) achieve and maintain highest reasonably sustainable levels of energy, hard rock (including nuclear) resources; (5) achieve and maintain highest reasonably sustainable levels of livestock grazing; (6) achieve and maintain highest reasonably sustainable levels of watersheds; (7) preserve traditional access for recreational opportunities; (8) recognize and incorporate county transportation plans for motorized access; (9) protect and preserve cultural resources in cooperation with the State Historic Preservation Office; (10) preserve rights of access to private property; (11) recognize and incorporate State School and Institutional Trust Lands Administration fiduciary agreement provisions when planning for uses near trust lands; (12) oppose the designation of areas of critical environmental concern (ACECs) except in well documented special cases; (13) coordinate visual resource management provisions with State and local governments. Class I and II VRM designations are generally not compatible with state and local plans; and (14) include a comprehensive socioeconomic analysis in all decision documents. **Note:** This plan was signed in November 2011, following development of the draft plan and DEIS.
Mohave County General Plan (Draft)	Mohave County	Key natural resource goals include: (1) maintain and improve air quality; (2) preserve the quantity and quality of water resources in perpetuity; (3) hillside protection; (4) wetland protection; (5) habitat preservation; (6) minimizing excessive noise; and (7) preserve, protect and enhance scenic routes and vistas that characterize the rural beauty of Mohave County.
Local		
Tusayan Area Plan (adopted April 7, 1995 and amended May 5, 1997)	Coconino County, Arizona	Most of the goals for the Tusayan plan are focused on infrastructure to support the vision statement as a gateway to Grand Canyon National Park. Natural resource goals include: (1) quality of all surface waters and groundwaters shall be protected to preserve or improve existing qualit; (2) every effort shall be made to preserve or improve air quality; (3) every effort shall be made to minimize the amount of outdoor lighting in order to preserve the dark night sky without jeopardizing reasonable utility, safety, and security concerns; (4) the community shall make every attempt to protect and improve the aesthetic and audio quality of the environment and to prevent negative impacts on property values and quality of life; and (5) the community, including public agencies, shall protect and preserve native vegetation and wildlife habitat areas, and shall especially seek to protect unique natural areas and rare endangered plant and animal species.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
City of Williams General Plan (2003)	City of Williams	Goals: Continued respect for the natural environment, balanced economy, affordable housing, spaciousness for outdoor recreation, and support business diversity and the hospitality industry attractions. Objectives: (1) develop pathway systems tied to Forest Service trails; (2) protect water availability and quality; (3) maintain the integrity of the golf course and other recreation areas; and (4) mitigate negative impacts to the city's land, air, and water resources Strategies include: (1) use scenic easements and buffering techniques to retain picturesque, spacious character; (2) cooperate with Coconino County and the Forest Service to prevent the degradation of the forests, waters, and other natural assets; and (3) evaluate development suitability and consider protective measures for habitat wildlife corridors and natural vegetation.
Greater Williams Area Community Wildfire Protection Plan (WACWPP) (2005)	Multiparty	The WACWPP contains the following strategic goals: (1) create the greater Williams area community base map, define the wildland-urban interface at risk, and perform a risk analysis to identify priority areas for treatment on Federal, State, and private lands; (2) offer a wide range of treatment options for use on Federal, State, and private lands; (3) educate the public in firewise treatments around their homes as well as ways to reduce structural ignitability through fuels treatment, defensible space, and use of fire resistant building materials; (4) educate the public in hazardous fuels treatments needed in the wildland urban-interface to not only protect lives and infrastructure, but also to protect the ecosystems that are so valuable in the Williams area; (5) improve fire prevention and suppression efforts; (6) reduce hazardous forest fuels; (7) promote community involvement in the CWPP process and fuels treatments; (8) provide options for the city and fire districts to reduce structure ignitability; and (9) encourage development of small wood processing businesses to aid in funding the necessary fuels treatments as well as promote economic development in the area.
The Code of the Town of Fredonia	Town of Fredonia	Focus of the Fredonia Town Code is on providing town infrastructure and services. Fredonia's niche is as the gateway to Grand Canyon National Park's North Rim. Much of the business growth in Fredonia centers around the provision of services for the community.
Tusayan Community Wildfire Protection Plan (TCWPP) (2005)	Multiparty	The goals of the TCWPP are to: promote community involvement in the TCWPP process, improve fire prevention and suppression, reduce hazardous forest fuels, restore forest health, educate the public in firewise treatments around their homes and businesses to reduce structural ignitability in the TCWPP area, recommend measures to create a more wildfire defensible community, and support HFRA, Title II- Biomass, Section 201-203.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Community Wildfire Protection Plan for the Flagstaff and Surrounding Communities in the Coconino and Kaibab National Forests (2005)	Multiparty	To protect Flagstaff, surrounding communities, and associated values and infrastructure from catastrophic wildfire through: (a) an educated and involved public; (b) implementation of forest treatment projects designed to reduce wildfire threat and improve long-term forest health, in a progressive and prioritized manner; and (c) utilization of Firewise building techniques and principles.
Tribal		
Hopi Woodland Management Plan (2006)	The Hopi Tribe	The Hopi Woodland Management Plan is an integrated resource management plan for the almost 200,000 acres of pinyon-juniper woodlands on the Hopi Reservation. The primary objective: protection of woodland spiritual and cultural values, while providing tribal members with the opportunity to harvest subsistence amounts of firewood and fencing material. Other objectives include protection and provision of traditionally used resources; wildlife habitat; watersheds; threatened, endangered, and culturally sensitive species; prevention of noxious weed invasion; protection and restoration of riparian areas; and promoting pinyon nut harvest.
Navajo Nation Forestry Plan (2001)	Navajo Nation Forestry Department	The Navajo Nation Forestry Department manages about 600,000 acres of ponderosa pine and mixed conifer forest and about 4.8 million acres of pinyon-juniper woodlands and provides for the protection and management of the Navajo Nation's forest and woodland resources in a manner that benefits the Navajo Nation and all tribal members.
Hualapai Fire Management Plan (2002) and Watershed Management Plan (2006)	Hualapai Tribe Department of Natural Resources	The overall goal of the Haulapai Department of Natural Resources is to produce long-term, sustainable, balanced, multiple use of natural resources under the direction of the Hualapai Tribal Council. The fire management plan includes goals to: (1) protect human safety and property while managing timber and range resources sustainably; (2) maintain adequate air and water quality; and (3) reduce the likelihood of catastrophic fire. The 2006 Watershed Management Plan includes identification of nonpoint source pollution sources and associated mitigation actions to improve water quality in the Colorado River and within the Truxton Wash and Upper Gila watersheds. The tribe is actively managing endangered native fish and an active elk hunting program.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Federal		
Recovery Plan for the Mexican Spotted Owl (2012)	U.S. Fish and Wildlife Service	Provides general guidance for activities in the Mexican spotted owl recovery unit which helps to maintain consistency with other agency planning efforts.
Recovery Plan for the California Condor (1996)	U.S. Fish and Wildlife Service	Provides general guidance for activities in the California Condor 10(j) Experimental Range which helps to maintain consistency with other agency planning efforts.
Recovery Plan for the Apache Trout (2009)	U.S. Fish and Wildlife Service	Provides general guidance for activities in Apache trout habitat which helps to maintain consistency with other agency planning efforts.
U.S. Fish and Wildlife Service Draft Land-Based Wind Energy Guidelines Recommend-ations on measures to avoid, minimize, and compensate for effects to fish, wildlife, and their habitats	U.S. Fish and Wildlife Service	Addresses risks to fish and wildlife resources. These draft guidelines, when used in concert with the appropriate regulatory tools, will be the best practical approach for conservation of species of "Federal trust responsibility." These draft guidelines are intended to: (1) promote compliance with relevant wildlife laws and statutes; (2) encourage scientifically rigorous survey, "monitoring," assessment, and research designs proportionate to the "risk" to "affected species;" (3) produce potentially comparable data across the Nation; (4) avoid, minimize, and/or compensate for potential adverse effects on fish, wildlife, and their habitats; and (5) improve the ability to predict and resolve effects locally, regionally, and nationally.
A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats (2011)	U.S. Fish and Wildlife Service	This plan provides a coordinated national management strategy for investigating the cause of white-nose syndrome and finding a means to prevent the spread of the disease.
General Land Management Plan for the Grand Canyon National Park (1995)	Grand Canyon National Park	Focuses on desired conditions, monitoring, and adaptive management with mutually common goals of promoting native vegetative communities and ecological processes. These goals should help to provide healthy habitat for wildlife and sustainable, resilient ecosystems over the greater landscape.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
North Rim Development Plan for the Grand Canyon National Park	Grand Canyon National Park	The North Rim Development Plan outlines a number of enhancements in visitor services, structure utilization, employee housing, and vehicular/pedestrian circulation for the North Rim Unit of Grand Canyon National Park. The North Rim Development Plan also includes the mitigation measures outlined in the FONSI and Programmatic Agreement developed as part of the NEPA and NHPA compliance completed for the plan and an estimate of the implementation costs for all plan components. The appendix includes an analysis of visitation and transportation, recommendations for employee housing, and a more detailed breakdown of building rehabilitation needs and costs.
Fire Management Plan for Grand Canyon National Park (2012)	Grand Canyon National Park	Specifies a mixed fire treatment program. Defines new fire management units which include suppression, wildland fire use, and prescribed fires and nonfire treatments with additional options of mechanical and manual hazard fuel treatment techniques. The focus is on restoring and maintaining park ecosystems with prescribed and wildland fire-use fire and reducing hazard fuels in wildland-urban interface areas using prescribed fire and nonfire treatments.
BLM-Arizona Strip Resource Management Plan (2008)	BLM	Focuses on desired conditions, monitoring, and adaptive management with mutually common goals of promoting native vegetative communities and ecological processes. These goals should help to provide healthy habitat for wildlife and sustainable, resilient ecosystems over the greater landscape.
Coconino, Prescott, and Apache-Sitgreaves National Forests draft land management plans (in revision)	USDA Forest Service	Forest planning efforts based upon the same regional vegetative desired conditions, standards, and guidelines, and similar objectives for ponderosa pine and mixed conifer as the Kaibab NF. The cumulative restoration activities from the action alternatives from these plans could have a landscape level effect on modifying stand structure to reduce the risk of stand-replacing fire in these vegetation types, while promoting resiliency with regard to climate change.
Four Forest Restoration Project (4FRI)	Coconino, Kaibab, Apache-Sitgreaves, and Tonto National Forests	A large-scale planning effort in the adjacent vicinity focused on improving resiliency in fire-adapted ecosystems. If implemented, the 4FRI could treat up to 55,000 acres annually across the Kaibab NF and adjacent NFS lands. The cumulative effect of this process could have widespread beneficial outcomes in restoration across the forest including decreased susceptibility to large disturbances (e.g., uncharacteristic wildfire and insect outbreaks) and increased water yields from winter snowfall through the creation of interspaces. The scale of this project is such that these changes could have a meaningful impact on wildlife habitat by improving adaptability of ponderosa pine type to a changing climate and providing for it well into the future.

Table L 2. Planning and land use policies of State, local, tribal governments and other Federal agencies in the greater landscape

Planning Document	Agency	Description
Camp Navajo Integrated Resource Management Plan (INRMP)	Department of Defense	The INRMP provides information on the management of natural resources on Camp Navajo. It describes the setting, defines land management units, and the manner that they will be managed to sustain ecological functions and ensure that Camp Navajo can support present and future training and testing requirements while maintaining, improving, and enhancing ecosystem integrity. Goals include: (1) protect sensitive and other nongame species; (2) provide sustained military training and outdoor recreation opportunities: (3) preserve desert washes and native vegetation, protection of special areas, water and wildlife management, wildfire prevention, and pest management; and (4) making lands available to the public for educational or recreational use of natural and cultural resources. Strategies include: implementation of an ecosystem management philosophy, implementation of the full Integrated Training Area Management Program, use of the Land Rehabilitation and Maintenance component of Integrated Training Area Management to plan rehabilitation projects for damaged areas, a study to determine methods for managing and restoring old growth forests, planning and implementing thinning, and prescribed burning.
Memorandum of Understanding (MOU) California Condor	Multiparty	Establishes a general framework for cooperation and participation among all cooperators to promote the recovery of the California condor. The MOU applies to the Southwest California condor reintroduction program and designated nonessential experimental population.
National Best Management Practices for Water Quality Management on National Forest System Lands (2012)	USDA Forest Service	"This technical guide is the first volume of guidance for the Forest Service, U.S. Department of Agriculture, National Best Management Practices (BMP) Program. The National BMP Program was developed to improve agency performance and accountability in managing water quality consistent with the Federal Clean Water Act (CWA) and State water quality programs. Current Forest Service policy directs compliance with required CWA permits and State regulations and requires the use of BMPs to control nonpoint source pollution to meet applicable water quality standards and other CWA requirements."

Appendix M. Crosswalk Between Key Direction from the 1988 Forest Plan (as amended) and the Revised Forest Plan

The intent of this appendix is to provide greater transparency on how existing plan direction (e.g. standards and guidelines) was incorporated into the revised plan. The following table is not an exhaustive account of all plan direction, but rather highlights those issues that drove the plan revision process (e.g. priority needs for change) and or were critical to Appendix A (response to comments). The revised plan is strategic in nature, as such; many of the standards and guidelines in the current plan were reframed as desired conditions or guidelines in the revised plan. In other instances, existing plan guidance was modified or removed because it reiterated other law, regulation, or policy.

KEY

Plan Components

DC: Desired Conditions, OBJ: Objective, ST: Standard, GD: Guideline, MA: Management Area, EMA: Ecosystem Management Area.

Vegetation

PP: Ponderosa pine, MC: Mixed conifer, DBH: Diameter at Breast Height, DRC: Diameter at Root Collar, BA: Basal Area

Wildlife

ESA: Endangered Species Act, MBTA: Migratory Bird Treaty Act, MSO RP: Mexican spotted Owl Recovery Plan, FWS: Fish and Wildlife Service. TES: Threatened, Endangered, and Sensitive Species, MIS: Management Indicator Species, NOGO: Northern Goshawk, PAC: Protected Activity Center, MRNG: Management Recommendations for Northern Goshawk (GTR-217), AGFD: Arizona Game and Fish Department, NNL: National Natural Landmark

Other

FSM: Forest Service Manual, FSH: Forest Service Handbook, BMP: Best Management Practice, MOU: Memorandum of Understanding, SDWA: Safe Drinking Water Act, 1988 Land Management Plan (as amended): 1988 plan

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Facilities	**Management Direction for EMA 4:** Maintain Kendrick Mountain lookout tower to present state. Prevent expansion of lookout tower and electronic facilities. Service and maintain facilities by primitive means.	**GD for Wilderness Area**: The fire lookout on Kendrick Mountain should be supplied and maintained using non-motorized equipment and non-mechanized transport.	FSM 7310	Under the 1988 plan this was rather vague direction, neither a ST nor GD.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Facilities	**Potable Water Management for EMA 21:** Monitor potable water systems in accordance with Safe Drinking Water Act.	**DC for Potable Water**: Potable water systems are safe for human consumption.	SWDA	Under the 1988 plan this was rather vague direction, neither a ST nor GD. Redundant with other law.
Fire	**Treatment of Natural Fuels for EMA 4:** Use fire with both prescribed fire and wildland fire use to break up unnaturally large areas of continuous fuel and create a more natural "mosaic" of fuelbeds. Target stand size is 50 to 150 acres.	**PP and Frequent Fire MC DCs mid-scale**: Fires burn primarily on the forest floor and typically do not spread between tree groups as crown fire. **OBJ for Ponderosa Pine**: Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. **OBJ for Frequent Fire MC:** Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. **GD for Vegetation Management:** The location and layout of vegetation management activities should effectively disconnect large expanses of continuous predicted active crown fire.	Federal Wildland Fire Policy (2001), ESA	Under the 1988 plan, the direction was rather vague, neither a ST nor GD. However, the terms and conditions in the Biological Opinion for the Environmental Assessment of a Wildland Fire Use Program within the Kaibab NF did not allow management of wildfires for resource benefits in the mixed conifer types on the NKRD, and set prescriptive limits within MSO habitat on the Williams District. Revised as DCs OBJs, GDs in the new plan.
Fire	**GDs for Fire Protection in EMAs, 2, 10, 13:** Fires from unplanned natural ignitions may exceed these size limits when burning within a predetermined prescription approved area and declared a prescribed fire wildland fire use action.	**MA in Wildland Fire Management:** In areas moderately to highly departed from desired conditions, somewhat higher fire intensities and the associated fire effects may be acceptable or even desirable at the fine scale to move fire behavior toward desired conditions. Multiple small areas of high mortality are preferred over a single large, high-severity event.	Guidance for the Implementation of Federal Wildland Fire Management Policy, 2009	Covered under other direction.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Fire/ Wildlife	**Fire Management Planning and Analyses for EMA 19**: Protect the aquatic habitat in North Canyon. The maximum size objective for any fire within a two mile radius of North Canyon Spring is 5 acres**. Initial Attack Fire Suppression:** Use appropriate suppression methods to control all wildfires within a 2-mile radius of North Canyon Spring.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **DCs for Wilderness:** A reproducing population of Apache trout is maintained in North Canyon Creek. **STs for Wildfire Management:** Managers will use a decision support process to guide and document wildfire management decisions. **GDs for Wildfire Management**: Decision documents, which define the objectives and document line officer approval of the strategies chosen for wildfires that progress past initial attack, should include interdisciplinary input to assess site-specific values at risk and develop incident objectives and courses of action to enhance or protect those values. At a minimum, the interdisciplinary team should: "Develop objectives and courses of action to address the desired conditions for wildlife habitat and key habitat features such as snags, logs, large tree-form oaks, and oak thickets."	ESA	In the 1988 plan, it is unclear what kind of management direction this is, not specifically labeled as ST or GD. Some of this direction is redundant with other law and policy. Reframed as explicit STs, GDs, and DCs in new plan.
Fire	**GDs for Fire Protection:** Fires which exceed or are expected to exceed the size objective are considered escaped and appropriate response is determined by an escaped fire situation analysis (EFSA). The EFSA will consider at least the following: Ignition source of the fire (lightning or person-caused). 2. If lightning caused, the appropriateness of the predicted burn with respect to the objectives of fire management in wilderness. 3. Resource management emphasis and protection objectives of threatened management area. 4. Suppression costs commensurate with resources protected. 5. Effects of suppression tactics on wilderness values, air quality, aesthetics, soil, and watershed. 6. Social acceptance of acreage burned. 7. Current availability of suppression resources. 8. Safety of personnel.	**ST for Wildland Fire Management:** Initial action on human-caused wildfires will be to suppress the fire at the lowest cost with the fewest negative consequences with respect to firefighter and public safety. Managers will use a decision support process to guide and document wildfire management decisions.	Federal Wildland Fire Policy, 2001, Guidance for the Implementation of Federal Wildland Fire Management Policy, 2009	Direction was elevated to a standard in the revised plan and reflects more current fire decision policy.

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Forestry/ Wildlife	**Standards for EMAs 1, 3, 8, 9, 12&16:** Provide for the following snag and other tree objectives: 1. Regionally consistent Standards and Guidelines apply for snag management in ponderosa pine, mixed conifer and spruce-fir cover types. 2. Pinyon-juniper type: not less than 100 snags et al., 9 inches and larger DRC and 12 feet in height, per 100 acres over 65 percent of the forested area.	**GDs Vegetation Management in all Forested Communities :** Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time. Large snags, partial snags, and trees (>18 inches dbh.) with broken tops, cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter). **DCs for Ponderosa Pine (Mid-scale):** Snags 18 inches diameter at breast height (d.b.h.) or greater average 1 to 2 snags per acre. Snags and green snags of various sizes and forms are common. **(Land-scape-scale:** The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present. Snags, green snags, and coarse woody debris occur across the landscape. **DCs for Frequent Fire MC (Mid-scale):** Snags and green snags 18 inches d.b.h. or greater average three per acre. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre.**(Land-scape scale):** The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees (e.g. snags, top killed, lightning and fire scarred trees) and coarse woody debris (greater than 3 inches diameter) are present and well distributed throughout the landscape. Mesic **MC/Spruce Fir (Mid-scale):** The number of snags and downed logs (greater than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inches diameter) vary by seral stage. Snags 18 inches or greater d.b.h. typically range from one to five snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. **(Land-scape scale):** The landscape is composed predominantly of vigorous trees, but older declining trees (e.g. snags and top killed, lightning-, and fire-scarred trees), as well as coarse woody debris, are present. **DCs for All Pinyon-juniper Communities:** The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and burls. Snags, green snags, and downed trees > 10″ at root collar are present and average 1 to 2 per acre. Some		Confusing as written in the 1988 plan, a standard that references both STs and GDs, the majority of snag direction is actually GDs. Direction has been reframed as forest-wide GDs and DCs for respective vegetation types. More information on snag densities has become available since the 1988 plan was signed, but still snag dynamics are poorly understood and reflect wide ranges in spatial and temporal variability across the different vegetation types.

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		tree groups have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging. **GDs for Pinyon-juniper:** Where pinyon-juniper obligate species occur (e.g. gray vireo), project design should use methods (e.g. selective pruning, lop and drop etc.) that emphasize the retention of key habitat features including snags, and partially dead or dying trees, and downed logs.		
Forestry/ Wildlife	**GDs for non-structural habitat improvements for EMAs 1,3,8,9,12,16** a. Manage Gambel oak for increased hard mast production, cavities, and deciduous foliage volume to promote and enhance wildlife habitat.	**GDs for Vegetation Management in all Forested Communities**: Project design and treatment prescriptions should generally not remove: Gambel oak >8 inches, diameter at root collar. **PP DCs fine scale:** Large tree form oaks, snags, and partial snags with hollow boles or limbs are present. **Mid-scale:** Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. **Landscape scale:** Where it naturally occurs, Gambel oak is present with all structure classes represented. It is reproducing and maintaining or expanding its presence on suitable sites across the landscape.		GDs were modified to be more explicit and extended forest wide. DCs provide aspirational direction for GDs.
Forestry/ Wildlife	**GD for Range non-structural improvement for EMAs 1, 3,8,9,12,16** Opening is not larger than 40 acres excepting that in primary pronghorn antelope range.	**DCs for All Pinyon-juniper communities**: Pinyon-juniper communities occur as a shifting mosaic interspersed with openings across the landscape. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. **ST for Vegetation Management in all Forested Communities:** The maximum size opening that may be created in one harvest operation for the purpose of creating an even-aged stand shall not exceed 40 acres except when it is following a large-scale disturbance event such as a stand replacing fire, wind storm, or insect or disease outbreak.		Direction replaced by forest wide DCs for pinyon-juniper communities and ST on maximum opening size.

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Forestry/ Wildlife	**GD for EMAs 1, 3, 8, 9, 12&13:** Pronghorn antelope habitat: a. In key antelope ranges, maintain existing openings and create additional openings as provided for in Wildlife Non-structural Habitat Improvement [HB]. Provide for high forb composition (25 percent). a. In antelope range, remove all net wire fences; in the interim, modify every one-half mile of such fence to facilitate movement.	**DCs for Wildlife:** Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. Interconnected forest and grassland habitats allow for movement of wide ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g., mountain lions). Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promote genetic flow between wildlife populations. Human-wildlife conflicts are minimal. Hunting, fishing and other wildlife based recreation opportunities exist, but do not compromise species populations or habitat. **DCs for All Grasslands:** Vegetation is dominated by herbaceous plants composed of a mix of native grasses and forbs. In pronghorn habitat, understory vegetation provides cover for fawning. Vegetation composition is within the natural range of variability and contains diverse native herbaceous plant species that provide nutrition for pronghorn and other species. Depending on soil type, bare soil varies between 5 and 80 percent. Basal vegetation varies between 5 and 60 percent ground cover. Organic litter varies between 30 and 50 percent of the ground cover. Vegetation composition will average 40 to 60 percent grass, and 10 to 30 percent forbs. **OBJs for Restoring Grasslands:** To restore the extent and quality of grasslands and grassland habitat: Reduce tree density to less than 10 percent on 5,000 to 10,000 acres of historic grasslands annually. Modify fences and/or install crossings to facilitate pronghorn movement on 50 miles of fence within 10 years of plan approval. **GDs:** Pronghorn fence crossings should be installed along known movement corridors. In areas where native herbaceous cover is sparse and seed sources are depleted, seeding should be considered. **DCs for Livestock Grazing:** Allotment fencing allows for passage of animals susceptible to movement restrictions such as pronghorn. **GDs:** Livestock management should favor the development of native cool season grasses and forbs. New construction and reconstruction of fences should have a barbless bottom wire that is at least 18 inches high.		Revised plan actually has more GDs and plan guidance for pronghorn, a species which has been retained as an MIS. Most net wire on the forest has been removed since the 1988 plan was signed and new GDs better reflect BMPs for fence construction.

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Forestry/ Wildlife	**GD for EMAs 1, 3 8, 9, 12&13,** Red squirrel habitat: a. Manage for at least 40 percent of potential habitat capability for red squirrels in assessment areas as determined by the Forest Habitat Capability Model. As needed to meet habitat capability, protect red squirrel primary caches at a density of one cache per two acres. Retain all trees within a 26-foot one-half chain radius from the cache (1/20 acre mixed-conifer only). This does not apply to regeneration areas.	**DCs for Wildlife**: Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. **GDs for Wildlife Management**: Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. **Management Approach for Wildlife:** The Kaibab NF strives to create and maintain natural communities and habitats in the amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plant, aquatic, and wildlife species within the planning area while contributing to broader landscape-scale initiatives where appropriate.....The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive at the Forest plan level; project /site specific. Squirrels are not being carried forward as an MIS; hunted species. Viability for red squirrels was provided through the course-filter analysis and vegetation components. No additional fine-filter components were necessary at the plan level.
Forestry/ Wildlife	**Wildlife Habitat ST for EMAs 1, 3, 8, 9, 12,16:** Snags and cavity, cull and damaged trees: Select larger trees for retention from the following categories in sequence: a. Existing snags and dying trees. b. Living trees with cavities. c. Trees with dead tops, spike tops, and damaged tops. d. Living cull and damaged trees. e. Living diseased trees, excepting mistletoe infected trees, not accounted for in 1 through 4 above. f. Living healthy trees. g. Avoid retention of mistletoe infected trees. Intensively manage emphasis areas (forest opening edges, water sources) to meet snag et al. objectives.	**GDs for Vegetation Management in All Forested Communities:** Project design and treatment prescriptions should generally not remove: Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time. Large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops, cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter). **Also see DCs for Ponderosa Pine, Frequent Fire Mixed Conifer and Mesic Mixed Conifer for description of snags to be retained.**		Revised as forest wide GDs and DCs.

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Forestry/ Wildlife	**Wildlife Habitat ST 1, 3, 8, 9, 12, 16:** Raptor habitat **except** goshawk and MSO. Bald eagle: a. Provide a 10-chain uncut buffer zone around existing and potential bald eagle winter roosts. b. Identify and protect foraging perches and potential roost sites.	**GDs for Wildlife:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15. **GDs for TES:** Activities occurring near areas used by bald eagles should follow recommendations identified in the National Bald Eagle Management Guidelines and Arizona Conservation Assessment and Strategy for the Bald Eagle. **Management Approach Wildlife:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. For example; the wildlife guideline specifying disturbance buffers around raptor nests is intended as a minimum buffer. Some raptor species (e.g., osprey) are more adapted to disturbance and are likely to tolerate a buffer of just 300 yards during the breeding season while other, less tolerant species (e.g. peregrine falcons (*Falco peregrinus*)) may require buffers of up to a ½ mile. Wildlife biologists work with other IDT resource specialists to identify and define the appropriate site specific buffers (within the context of plan guidance) for other raptors on a case-by-case basis.	MBTA, Bald and Gold Eagle Protection Act, FSM 2670.32	Bald eagles have been delisted since the 1988 plan was signed. They are still a sensitive species and are protected through other mandates in addition to the forest plan. STs were revised as GDs.

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Forestry/ Wildlife	**Wildlife Habitat ST 1, 3, 8, 9, 12, 16:** Raptor habitat **except** northern goshawk and Mexican spotted owl. Retain raptor nest tree-groups and a non-activity buffer around raptor nest sites as follows: Cooper's hawk: 7-chain buffer zone around the nest, Sharp-shinned hawk: 6-chain buffer zone around the nest. Osprey: Provide an 8-chain uncut buffer area around existing (occupied or unoccupied) nests. Restrict logging activities within 20 chains of active nest sites between April 1 and August 15. Provide, for every ten surface acres of water, not less than five acres of mature and overmature trees with not less than four snags, with heights, equal to, or greater than, the surrounding trees, and not less than 20 inches in DBH, per acre, for potential osprey nesting sites. Provide uneven-aged and, or irregular-aged stand conditions within a 10-chain zone around aquatic areas with five or more surface-acres of water. Provide artificial nesting platforms as needed for habitat improvement. Prohibit road construction in roost areas and buffer zones. Others: 3-chain buffer zone around the nest.	**GDs for Wildlife:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15. **Management Approach Wildlife:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. For example; the wildlife guideline specifying disturbance buffers around raptor nests is intended as a minimum buffer. Some raptor species (e.g., osprey) are more adapted to disturbance and are likely to tolerate a buffer of just 300 yards during the breeding season while other, less tolerant species (e.g. peregrine falcons (*Falco peregrinus*)) may require buffers of up to a ½ mile. Wildlife biologists work with other IDT resource specialists to identify and define the appropriate site specific buffers (within the context of plan guidance) for other raptors on a case-by-case basis.	MBTA, Executive Order 13186	As written are overly prescriptive at the plan level. Specifications may vary by project and site. STs revised as GDs.

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Forestry/ Wildlife	**Wildlife Habitat STs for EMAs 1, 3,8,9,12,16.** Peregrine falcon habitat. a. Prohibit activities which disturb nesting birds between March 15 and August 15. If birds arrive in their territories before March 15, suspend disturbing activities immediately. Extend this period if the birds are strongly attached to the nest site after August 15. b. Take all reasonable precautions, consistent with policies regarding jeopardy to human life and property, during fire suppression, search and rescue, or other emergency operations from March 15 through August 15 to protect peregrine nesting sites and their confidentiality.	**GDs for Wildlife:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15. GD for TES: Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Management Approach Wildlife:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. For example; the wildlife guideline specifying disturbance buffers around raptor nests is intended as a minimum buffer. Some raptor species (e.g., osprey) are more adapted to disturbance and are likely to tolerate a buffer of just 300 yards during the breeding season while other, less tolerant species (e.g. peregrine falcons (*Falco peregrinus*)) may require buffers of up to a ½ mile. Wildlife biologists work with other IDT resource specialists to identify and define the appropriate site specific buffers (within the context of plan guidance) for other raptors on a case-by-case basis.	FSM 2670, MBTA, Executive Order 13186	This species has since been federally delisted and is currently a regionally sensitive species. Protected through other law, policy, and direction, but did revise STs as GDs. Forest wide GDs for raptors and TES species should provide protection at the project level.
Forestry/ Wildlife	**Wildlife Habitat ST for EMAs 1, 3,8,9,12,16**. Personal-use fuelwood standards. Pinyon Pine: a. Any dead and down tree b. any standing dead tree less than 12 DRC (10"DBH) c. Any standing dead tree less than 12 feet in height. Personal-use fuelwood standards. Gambel oak: a. Any dead and down tree. b. Any standing dead tree less than 8 inches in DBH. Juniper: a. Any dead and down tree. b. Any standing dead tree without green foliage). c. Any standing dead tree less than 15 feet in total height. Quaking aspen: a. Any dead and down tree. a. Any standing dead tree less than 12 inches in DBH.	**GDs for Fuelwood Collection:** The following should be permitted for personal use firewood gathering: Dead and downed ponderosa pine, Douglas-fir, white fir, spruce, juniper, pinyon pine, Gambel oak, and aspen; Standing dead: Ponderosa pine, Douglas-fir, white fir, or spruce less than 12 inches DBH or less than 15 feet in total height; Juniper without green foliage ; Pinyon pine less than 12 inches diameter at DRC or less than 12 feet in height; Gambel oak less than 8 inches DRC; Aspen less than 12 inches DBH, Live trees specifically designated by the Forest Service.		Modified as forest wide GDs for fuelwood collection. Additional restrictions within plan guidance may be defined through the special use permit process.

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Forestry/ Wildlife	**Wildlife Habitat STs for EMAs 1, 3,8,9,12,16.** Turkey habitat: a. Leave not less than four turkey roost-tree groups per section in turkey winter range b. Leave not less than two turkey roost-tree groups per section in turkey summer range. c. Emphasize turkey winter habitat in areas within 40 chains of pine stringers (pine stringers are defined as non-contiguous, linear communities of predominately ponderosa pine, up to 40 chains in width, that extend into pinyon-juniper woodland). d. Provide not less than 10 acres of untreated slash for nesting habitat within one-half mile of water. Consider slope, canopy, distribution and distance to water in the selection of treatment areas. e. Restrict activities in nesting areas from April 15 to July 1.	**DCs for Wildlife:** Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife species are present and in balance with healthy, functioning ecosystems. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. Human-wildlife conflicts are minimal. Hunting, fishing and other wildlife based recreation opportunities exist, but do not compromise species populations or habitat. **GDs for Wildlife:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. **GDs for Vegetation Management in all Forested Communities:** Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). **Management Approach Wildlife:** The Kaibab NF strives to create and maintain natural communities and habitats in the amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plant, aquatic, and wildlife species within the planning area while contributing to broader landscape-scale initiatives where appropriate. This is accomplished in an integrative fashion by working closely with range, fire, timber, and other resource areas to coordinate and maximize activities for wildlife benefit. Cooperation with State and federal wildlife management agencies also helps to minimize conflicting wildlife resource issues related to hunted, fished, and trapped species.		Specific habitat needs will be determined at the project level. Turkeys not being carried forward as an MIS. Turkeys are provided for through the course filter wildlife viability analyses by providing healthy vegetation conditions and structural diversity. No additional fine filter habitat needs were identified as plan components.
Forestry/ Wildlife	**Wildlife Habitat ST for EMAs 1, 3,8,9,12,16.** Tassel-eared squirrel habitat: a. Manage for at least 40 percent of potential habitat capability for tassel-eared squirrels in assessment areas as determined by the Forest Habitat Capability Model. To maintain habitat capability, retain one nest tree group per five acres.	**DC for Wildlife:** Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife species are present and in balance with healthy, functioning ecosystems. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting		Tassel-eared squirrel not retained as an MIS, models outdated by new science and methods. Overly prescriptive at the plan level, site specific direction. Viability provided for through course filter analyses (vegetation) no additional fine scale habitat components were identified for

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	Retain all trees within a 26-foot one-half chain radius from the nest (1/20 acre ponderosa pine only). This does not apply in regeneration areas.	sites. Human-wildlife conflicts are minimal. Hunting, fishing and other wildlife based recreation opportunities exist, but do not compromise species populations or habitat. **DC Ponderosa Pine (Fine-scale):** Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Tree groups are made up of clumps of various age classes and size classes that typically occur in areas less than one acre, but may be larger, such as on north-facing slopes. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group. Isolated infestations of Southwestern dwarf mistletoe may occur, but the degree of severity and amount of mortality varies among the infected trees. Witches' brooms may form on infected trees, providing habitat and food for wildlife and invertebrate species. **(Mid-scale**): Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, nesting/roosting habitat, drainages, and steep north-facing slopes). **DCs Frequent Fire MC (Fine-scale):** Dwarf mistletoe infections may be present on ponderosa pine and Douglas-fir, and rarely on other tree species, but the degree of infection severity and rate of mortality varies among infected trees. Witches' brooms may be present with these infestations, providing habitat for wildlife. **(Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas (PFAs), Mexican spotted owl nesting/roosting habitat, and north-facing slopes. **DCs for The Kaibab Squirrel NNL:** The Kaibab Squirrel NNL provides quality ponderosa pine habitat for the Kaibab squirrel. **GDs for Vegetation Management in all Forested Communities:** Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time.		this species beyond the NNL designation for the Kaibab squirrel (tassel-eared squirrel sub-species)..

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Forestry/ Wildlife	**Wildlife Non-structural Habitat Improvement GDs EMAs 1, 3, 8, 9, 12, 16:** Gambel oak: Retain all standing oak trees eight inches and larger at DBH. Quaking aspen: Treat aspen using special cutting methods. Optimum size of the treatment area is four acres although in some situations larger areas (10 acres+) can be treated. Prohibit grazing of improvement areas for not less than one growing season immediately following treatment. Remove coniferous understory during treatment. Alligator juniper: Retain live, large alligator juniper for wildlife habitat where it occurs with ponderosa pine.	**DCs for Wildlife:** Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. **GDs for Vegetation Management in all Forested Communities:** Gambel oak >8 inches, diameter at root collar. **GDs for Livestock grazing:** Livestock use in aspen areas should be authorized at levels that are consistent with the desired conditions for aspen regeneration and establishment. **Management Approach for Wildlife:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. **Also see DCs, OBJs, and GDs for Aspen.**		Revised as forest wide guidance.

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Forestry/ Range/ Wildlife	**Wildlife Non-structural Habitat Improvement GDs for EMAs 1, 3,8,9,12,16.** Created openings in pinyon-juniper woodland: Exclude livestock from seeded areas for not less than two growing seasons immediately following treatment. The maximum sight distance within the opening is 15 chains excepting in primary pronghorn antelope range. The minimum distance between any two openings is 10 chains	**DCs for all Pinyon-juniper Communities:** Pinyon-juniper communities occur as a shifting mosaic interspersed with openings across the landscape. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. **DCs for Wildlife:** Interconnected forest and grassland habitats allow for movement of wide ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g., mountain lions). Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promote genetic flow between wildlife populations. **DCs for Livestock Grazing:** Livestock use is consistent with other desired conditions. **GDs for Livestock Grazing:** Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). **Wildlife Management Approach Management Approach**: The Kaibab NF strives to create and maintain natural communities and habitats in the amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plant, aquatic, and wildlife species within the planning area while contributing to broader landscape-scale initiatives where appropriate. This is accomplished in an integrative fashion by working closely with range, fire, timber, and other resource areas to coordinate and maximize activities for wildlife benefit. Cooperation with State and federal wildlife management agencies also helps to minimize conflicting wildlife resource issues related to hunted, fished, and trapped species.		Overly prescriptive at the plan level. Sight distance will vary based on topography and vegetation, structural diversity and composition. Revised as forest wide guidance.

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Forestry/ Wildlife	**GD for Non-structural habitat improvement EMAs 1, 3, 8, 9, 12, and 16:** Gambel oak: Consider age class distribution in project planning.	**DCs Ponderosa Pine (fine-scale):** Where historically occurring, Gambel oak thickets with various diameter stems and low growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species. Large tree form oaks, snags, and partial snags with hollow boles or limbs are present. **(Land-scape):** Where it naturally occurs, Gambel oak is present with all structure classes represented. It is reproducing and maintaining or expanding its presence within its natural range. **DCs Gambel Oak Shrubland**s: The system is dominated by native tall shrubs and hardwood trees. Some areas contain many trees with relatively large hollow boles or limbs. Coniferous trees are widely scattered and are frequently mature or old. Young Gambel oak thickets and sometimes other species comprise a patchy shrub layer. Old stands contain habitat for birds and arboreal nesting or roosting mammals. A variety of oak growth forms, sizes, and densities that benefit wildlife species can be found across the landscape. **GDs for Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design and treatment prescriptions should generally not remove: Gambel oak >8 inches, DRC.		Revised as forest wide direction. There is actually more direction in the revised plan for oak.
Forestry	**Intermediate Harvest Conifer GDs in EMAs 1, 3, 8, 9, 12 & 16**: Harvests within the ecotone between woodlands and ponderosa pine habitat types will not be initiated unless there is reasonable assurance that regeneration of ponderosa pine will occur within five years following a regeneration harvest. The selection regeneration methods will be the preferred method of regenerating stands within this ecotone.		National Forest Management Act (NFMA) of 1976, Sec. 4, FSM 2470.3	Already addressed by existing law, regulation or policy.

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Forestry	**Conifer Stand GDs for EMAs 1,3,8,9,12,16:** To provide for future snags requirements as specified in Wildlife Surveys, Planning, Prescriptions, Monitoring, Coop, and Administration, 3.a. (1) and (2), retain at least 400 live trees, 14 inches DBH and larger, per 100 acres, on 65 percent of the treatment acres in ponderosa pine stands; and at least 600 live trees , 14 inches DBH and larger, per 100 acres, on 65 percent of the treatment acres in mixed conifer stands. Select larger trees for retention from the following categories in sequence: (a) Living trees with cavities. (b) Trees with dead tops, spike tops, and damaged tops. (c) Living cull and damaged trees. (d) Living diseased trees, excepting mistletoe infected trees, not accounted for in a through c above. (e) Living healthy trees. (f) Avoid retention of mistletoe infected trees.	**GDs for Vegetation Management in All Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. On suitable timberlands, projects should retain somewhat higher frequencies of trees across broad diameter classes to allow for future tree harvest. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time. Large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops, cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter). Gambel oak >8 inches, diameter at root collar. Known bat roost trees. **DC Frequent Fire Mixed Conifer (Mid-scale):** The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Disturbances sustain the overall variation in age and structural distribution. **Management Approach Wildlife:** The Kaibab NF strives to create and maintain natural communities and habitats in the amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired nonnative plant, aquatic, and wildlife species within the planning area while contributing to broader landscape-scale initiatives where appropriate. This is accomplished in an integrative fashion by working closely with range, fire, timber, and other resource areas to coordinate and maximize activities for wildlife benefit.	FSM 2600 (2620.3, , 2621.4)	Overly prescriptive at the plan level. silviculturalists work with biologists on interdisciplinary teams to determine retention of key habitat elements at the site specific /project level.

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Goshawk	**Forest wide GD for NOGO Habitat:** Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should restore degraded riparian areas to good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.	**OBJ Natural Waters**: Protect and/or restore at least 10 individual springs within 5 years of plan approval. **OBJ Wetlands/Cienegas**: Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval. **GDs for Natural Waters**: Access to natural waters should be restricted to designated trails and points of entry to mediate erosion and prevent trampling and inadvertent introduction of nonnative and undesirable biota and disease. **DCs Natural Waters**: Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species. **DCs Wetlands/Cienegas:** Wetland conditions are consistent with their flood regime and flood potential. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly. **DCs for Cottonwood-willow Riparian Forest:** The extent, diversity, and condition of riparian habitat contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. Water flow regime approximates reference conditions (i.e., perennial flows) and flows freely. Sedimentation is minimized. Springtime flooding contributes to ecosystem sustainability by optimizing germination conditions for seedlings and/or suckering opportunities from the parent plant.		The revised plan actually has more direction and restoration objectives for natural waters. Streams are in Wilderness areas which preclude mechanized activities and alterations that would affect their wilderness character.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forest wide ST for NOGO Habitat:** Manage for uneven-age stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels throughout woodland, ponderosa pine, mixed conifer and spruce-fir forest cover types. Manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Sustain a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape. Provide foods and cover for goshawk prey.	**GDs under Vegetation Management for all Forested Communities**: Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). Mature trees with large dwarf mistletoe induced witches' brooms suitable for wildlife nesting, caching, and denning, except where retaining such trees would prevent the desired development of uneven-aged conditions over time. Large snags, partial snags, and trees (>18 inches DBH) with broken tops, cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter). Gambel oak >8 inches, DRC. **Also see all DCs for Ponderosa pine and Frequent Fire Mixed Conifer.**		Reframed as forest wide GDs and DCs for major vegetation types are. New direction is consistent with MRNG and provides for healthy sustainable goshawk habitat.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forest wide ST for NOGO Habitat:** Manage the ground surface layer to maintain satisfactory soil conditions i.e. to minimize soil compaction; and to maintain hydrologic and nutrient cycles.	**GDs for Soils and Watershed Management:** Projects should incorporate the national best management practices for water quality management and include design features to protect and improve watershed condition. In disturbed areas, erosion control measures should be implemented to improve soil conditions. **DCs for Soils and Watersheds:** Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration. **DC for Pinyon Juniper Communities**: Plant litter (leaves, needles, etc.) and understory plant cover contributes to soil stabilization, prevents erosion, promotes nutrient cycling, improves water retention, provides cover and forage for small mammals, and conditions necessary for pinyon seed germination. **DC for Ponderosa Pine (Fine-scale):** Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function. Herbaceous vegetation reflects the site potential. **DC for Frequent Fire Mixed Conifer (Fine-scale):** Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function. Herbaceous vegetation reflects the site potential. **DC for Mesic Mixed Conifer/Spruce Fir (Fine-scale)**: Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant diversity and ecosystem function. Understory vegetation reflects site potential. **DC for Aspen:** Understory vegetation consists of shrubby or herbaceous species, providing forage and cover for wildlife and habitat for invertebrates such as pollinators. **DC for Aspen in Mesic MC/Spruce Fir:** Downed aspen and woody debris are scattered across the landscape and provide habitat for a variety of wildlife species (e.g., small mammals, reptiles, amphibians, and birds) while contributing to efficient nutrient cycling. **GDs for Vegetation Management for all Forested Communities:** Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow.	FSM 2509.18; FSH 2509.22	Reframed as GDs and more explicit DCs for major vegetation types on the forest.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**GDs for Home Range Establishment:** Establish a minimum of three nest areas and three replacement nest areas per Post-fledgling family area. The nest areas and replacement nest areas should be approximately 30 acres in size. A minimum total of 180 acres of nest areas should be identified within each post-fledgling family area.	**GDs for TES:** A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size. Goshawk PFAs (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest sites.		Retained as a guideline with slightly different wording based on current scientific information.
Goshawk	**Forest wide GD outside PFA's:** General: The distribution of vegetation structural stages for ponderosa pine, mixed conifer and spruce-fir forests is 10% grass/forb/shrub (VSS1), 10% seedling-sapling (VSS2), 20% young forest (VSS 3), 20% mid-aged forest (VSS4), 20% mature forest (VSS 5), 20% old forest (VSS6). NOTE: The specified percentages are a guide and actual percentages are expected to vary + or - up to 3%.	**GDs for Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. **Also see DCs for Ponderosa Pine and Frequent Fire Mixed Conifer.**		DCs for vegetation types are consistent with MRNG and provide for sustainable goshawk habitat, prescriptive provisions not retained. See Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis (RMRS-GTR-310)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forest wide GDs outside PFAs:** Spruce-fir: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60% and 2/3 40%, mature forest (VSS 5) should average 60+%, and old forest (VSS 6) should average 60+%. Maximum opening size is 1 acre with a maximum width of 125 feet. Provide two groups of reserve trees per acre with six trees per group when opening size exceeds 0.5. Leave at least 3 snags, 5 downed logs, and 10-15 tons of woody debris per acre (including the downed logs).	**DCs for Mesic Mixed Conifer/Spruce Fire (Fine-scale):** Mid-aged and older trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. Small openings (gaps) are present as a result of past disturbances. **(Mid-scale):** The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently hundreds of acres; groups and patches of tens of acres or less are relatively common. Forest conditions in some areas contain higher basal area than the general Forest; examples include *goshawk* post-family fledgling areas, *Mexican spotted owl* nesting and roosting habitat, and north-facing slopes. A mosaic of primarily even-aged groups and patches, which vary in size, species composition, and age is present. Aspen is occasionally present in large patches. Density ranges from 20 to 250 square feet of basal area per acre, depending upon disturbance and seral stages of groups and patches. The number of snags and downed logs (greater than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inches diameter) vary by seral stage. Snags 18 inches or greater DBH typically range from one to five snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late seral stages. **(Landscape scale):** The vegetation community is a mosaic of structural and seral stages ranging from young trees through old and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to reference conditions. The landscape is composed predominantly of vigorous trees, but older declining trees (e.g. snags and top killed, lightning-, and fire-scarred trees), as well as coarse woody debris, are present. Old growth generally occurs over large areas as stands or forests. Old growth includes old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Also see GDs for Vegetation Management in all Forested Communities.**		DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat, prescriptive provisions not retained. See Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis (USDA 2013)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forest wide GDs outside PFAs:** Mixed Conifer: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60+% and 2/3 40+%, mature forest (VSS 5) should average 50+%, and old forest (VSS 6) should average 60+%. Maximum opening size is up to 4 acres with a maximum width of up to 200 feet. Retain one group of reserve trees per acre of 3-5 trees per group for openings greater than 1 acre in size. Leave at least 3 snags, 5 downed logs, and 10-15 tons of woody debris per acre, (including the downed logs).	**DCs Frequent Fire Mixed Conifer (Fine-scale):** Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlocking or nearly interlocking. Tree groups are typically less than 1 acre size and consist of 2 to 50 trees per group, but are sometimes larger, such as on north facing slopes. Regeneration openings occur as a mosaic and are similar in size to nearby groups. Interspaces between groups are variably shaped, are comprised of a native grass-forb-shrub mix, and may contain individual trees or snags. **(Mid-scale):** The frequent fire mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. Forest appearance is variable, but generally uneven-aged and open; occasional patches of even-aged structure are present. The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include *goshawk* post-fledging family areas, *Mexican spotted owl* nesting/roosting habitat, and north-facing slopes. Interspaces with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Snags and green snags 18 inches d.b.h. or greater average three per acre. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. **(Landscape-scale):** At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Forest appearance is variable but generally uneven-aged and open; occasional		DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat, prescriptive provisions not retained. See Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
		patches of even-aged structure are present. The forest arrangement is in small clumps and groups of trees interspersed within variably sized openings of native grass-forb-shrub vegetation associations similar to reference conditions. Size, shape, number of trees per group, and number of groups per area are variable across the landscape. The frequent fire mixed conifer forest community is composed predominantly of vigorous trees, but declining trees (e.g. snags, top killed, lightning and fire scarred trees) and coarse woody debris (greater than 3 inches diameter) are present and well distributed throughout the landscape**. Also see GDs for Vegetation Management in all Forested Communities and DCs for mesic MC/Spruce fir in the previous row.**		

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forestwide GDs outside PFAs.** Ponderosa Pine: Canopy Cover for mid-aged forest (VSS 4) should average 40+%, mature forest (VSS 5) should average 40+%, and old forest (VSS 6) should average 40+%. Opening size is up to 4 acres with a maximum width of up to 200 feet. One group of reserve trees, 3-5 trees per group, will be left if the opening is greater than an acre in size. Leave at least 2 snags per acre, 3 downed logs per acre, and 5-7 tons of woody debris per acre, (including the downed logs).	**DCs for Ponderosa Pine (Fine-scale):** Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group. The interspaces between groups are variably shaped, are comprised of a native grass/forb/shrub mix, and may contain individual trees or snags. Regeneration openings occur as a mosaic and are similar in size to nearby groups. Where Gambel oak comprises more than 10 percent of the basal area, it is not uncommon for canopy cover to be greater than 40 percent. **(Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habit. Snags 18 inches DBH or greater average 1 to 2 snags per acre. Snags and green snags of various sizes and forms are common. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average 3 logs per acre. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. **(Landscape-scale): T**he ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Occasional areas of even-aged structure are present. Denser tree conditions exist in some locations such as north-facing slopes, canyons, and drainage bottoms. The ponderosa pine forest is composed predominantly of vigorous trees, but declining trees are present. Snags, green snags, and coarse woody debris occur across the landscape. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).		Revised as DCs
Goshawk	**Forest wide GD for Home Range Establishment:** Post-fledgling family areas (PFA) will be approximately 600 acres in size. Post-fledgling family areas will include the nest sites and consist of the habitat most likely to be used by the fledglings during their early development.	**Guidelines under TES:** Goshawk PFAs (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest sites. A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size.		Language has been revised, but still a GD. This still equates to 600 acres (420 plus the 6 nest areas) of PFA.

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Goshawk	**Forest wide GDs within PFAs** General: Provide for a healthy sustainable forest environment for the post-fledgling family needs of goshawks. The principle difference between within the post-fledgling family area and outside the post-fledgling family area is the higher canopy cover within the post-fledgling family area and smaller opening size within the post-fledgling family area. Vegetative Structural Stage distribution and structural conditions are the same within and outside the post-fledgling family area.	**DC under TES:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation. Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest. **GDs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. Goshawk PFAs (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest sites.		Existing guideline more of a definition. Exists as both a DC and GD in the revised plan.
Goshawk	**Forest wide GDs within Nesting Areas** General: Provide unique nesting habitat conditions for goshawks. Important features include trees of mature to old age with high canopy cover.	**DC for TES:** Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest. **GDs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **DCs for Mesic Mixed Conifer/Spruce Fire (Fine-scale):** Mid-aged and older trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages, contributing to vertical and horizontal heterogeneity. Small openings (gaps) are present as a result of past disturbances. **DCs Frequent Fire Mixed Conifer (Fine-scale):** Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages, often containing more than one species. Crowns of trees within mid-aged and old groups are interlocking or nearly interlocking. **DCs Ponderosa Pine (Fine-scale):** Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine.		Existing guideline more of a definition. Exists as both a DC and GD in the revised plan

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Goshawk	**Forest wide GDs within PFAs:** Spruce-fir: Canopy Cover for mid-aged forest (VSS 4) should average 60+% and for mature (VSS 5) and old forest (VSS 6) should average 70+%.	**DCs Mesic Mixed Conifer/Spruce Fir (Mid-scale):** Forest conditions in some areas contain higher basal area than the general Forest; examples include goshawk post-family fledgling areas, Mexican spotted owl nesting and roosting habitat, and north-facing slopes. **Also see GDs for Vegetation Management in all Forested Communities.**		Overly prescriptive at the plan level and guidance not retained. DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis (RMRS-GTR-310)
Goshawk	**Forest wide GDs within PFAs** Mixed Conifer: Canopy Cover for mid-aged (VSS 4) to old forest (VSS 6) should average 60+%.	**DCs Frequent Fire Mixed Conifer (Mid-scale)**: Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include *goshawk post-fledging family areas*, Mexican spotted owl nesting/roosting habitat, and north-facing slopes. **Mesic Mixed Conifer/Spruce Fir:** Forest conditions in some areas contain higher basal area than the general Forest; examples include *goshawk post-family fledgling areas,* Mexican spotted owl nesting and roosting habitat, and north-facing slopes. **Also see GDs for Vegetation Management in all Forested Communities.**		Overly prescriptive at the plan level and guidance not retained. DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.
Goshawk	**Forest wide GDs within PFAs:** Ponderosa Pine: Canopy Cover for mid-aged forest (VSS 4) should average 1/3 60+% and 2/3 50+%. Mature (VSS 5) and old forest (VSS 6) should average 50+%.	**DCs for Ponderosa Pine (Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., *goshawk post-fledging family areas*, Mexican spotted owl nesting/roosting habitat, drainages, and steep north-facing slopes). **Also see GDs for Vegetation Management in all Forested Communities.**		Overly prescriptive at the plan level and guidance not retained. DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Goshawk	**Forest wide GDs within PFAs.** Woodland: Maintain existing canopy cover levels.	**DCs for all Pinyon-juniper communities:** At the mid-scale and above, canopy cover is at least 10 percent with a mix of young and mature groups and clumps of trees. Some tree groups have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging. **Also see GDs for Vegetation Management in all Forested Communities.**		No distinction for canopy cover for goshawk PFAs/nesting areas from the rest of the DCs. DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.
Goshawk	**Forest wide GDs within PFAs.** Spruce-fir, Mixed Conifer and Ponderosa Pine Cover Types: The nesting area contains only mature to old forest (VSS 5 & 6) having a canopy cover (measured vertically) between 50-70% with mid-aged VSS 6 trees 200-300 years old. Non-uniform spacing of trees and clumsiness is desirable.	See above mid-scale DCs for Ponderosa Pine, Frequent Fire MC and Mesic MC/Spruce Fir. **Also see GDs for Vegetation Management in all Forested Communities**.		Overly prescriptive at the plan level and guidance not retained. DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.

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Goshawk	**Forest wide GDs within nesting areas:** The structure of the vegetation within nest areas is associated with the forest type, and tree age, size, and density, and the developmental history of the stand. Table 5 of RM-217 presents attributes required for goshawks on locations with "low" and "high" site productivity.	**DCs for TES:** Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest. **DCs for Ponderosa Pine (Mid-scale):** The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. The more biologically productive sites contain more trees per group and more groups per area. **DCs for Frequent Fire Mixed-conifer (Mid-scale):** The frequent fire mixed conifer forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. Forest appearance is variable, but generally uneven-aged and open; occasional patches of even-aged structure are present. The more biologically productive sites contain more trees per group and more groups per area. Basal area within forested areas generally ranges from 30 to 100 square feet per acre, with larger trees contributing the greatest percent of the total basal area. **DCs for Mesic Mixed conifer/Spruce fir (Mid-scale):** The size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary, but are frequently hundreds of acres; groups and patches of tens of acres or less are relatively common.		This direction now captured through multiple DCs.
Goshawk	**Forest wide GDs within nesting areas.** Woodland: Maintain existing canopy cover levels.	**DCs for TES:** Goshawk nest areas are multi-aged forests dominated by large trees with interlocking crowns and are generally denser than the surrounding forest. **DCs for all Pinyon-juniper communities:** At the mid-scale and above, canopy cover is at least 10 percent with a mix of young and mature groups and clumps of trees. Some tree groups have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging.		No distinction for canopy cover for goshawk PFAs/nesting areas from the rest of the DCs for this vegetation type (limits redundancy).DCs for major vegetation types are consistent with MRNG and provide for healthy sustainable goshawk habitat. Also see Desired Conditions for Use in Forest Planning in the Southwestern Region: Development and Science Basis.

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Goshawk	**Forest wide GDs outside PFAs.** Woodland: Manage for uneven age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris.	**GDs for all Pinyon-juniper communities:** Restoration treatments in pinyon-juniper should be rotated over time and various successional stages to maximize wildlife habitat and diversity. **DCs for Pinyon-juniper Woodlands:** Pinyon-juniper woodland (persistent) is characterized by even-aged patches of pinyons and junipers that at the landscape level form uneven-aged woodlands. Tree density and canopy cover are high, shrubs are sparse to moderate, and herbaceous cover is low and discontinuous due to soil and other site conditions. **DCs for all Pinyon Juniper Communities:** Pinyon-juniper communities occur as a shifting mosaic interspersed with openings across the landscape. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and burls. Snags, green snags, and downed trees > 10″ at DRC are present and average 1 to 2 per acre.		Revised as a GD under pinyon juniper.
Goshawk	**Forest wide GDs outside PFAs.** Canopy Cover: Canopy cover guidelines apply only to mid-aged to old forest structural stages (VSS 4, VSS 5, and VSS 6) and not to grass/forb/shrub to young forest structural stages (VSS 1, VSS 2, and VSS 3).	**DCs for Ponderosa pine**: Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking and consist of approximately 2 to 40 trees per group. Ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Occasional areas of even-aged structure are present. Denser tree conditions exist in some locations such as north-facing slopes, canyons, and drainage bottoms.		Revised plan does not have VSS classes or canopy cover guidelines. DCs are consistent with MRNG.

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Goshawk	**Forest wide GDs outside PFAs.** Snags are 18" or larger DBH and 30 feet or larger in height, downed logs are 12 inches in diameter and at least 8 feet long, woody debris is 3 inches or larger on the forest floor, canopy cover is measured with vertical crown projection on average across the landscape.	**Mid-scale DCs Frequent Fire Mixed conifer:** Snags and green snags 18 inches DBH or greater average three per acre. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. **Mid-scale DCs Mesic Mixed Conifer/Spruce Fir:** The number of snags and downed logs (greater than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inches diameter) vary by seral stage. Snags 18 inches or greater DBH typically range from one to five snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late seral stages. **Mid-scale DCs for Ponderosa Pine:** Snags 18 inches DBH or greater average 1 to 2 snags per acre. Snags and green snags of various sizes and forms are common. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average 3 logs per acre. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre.		Revised plan definitions are now embedded in the DCs for individual forest communities. CWD and snags are in glossary.
Goshawk	**Forest wide GDs human disturbance**. The breeding season extends from March 1 through September 30.	**GDs for TES:** Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30.		Retained as a guideline in the revised plan with revised wording.

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Goshawk	**Management in goshawk habitat (Neither ST or GD).** Applicability: The northern goshawk standards and guidelines apply to the forest and woodland communities described below that are outside of Mexican spotted owl protected and restricted areas. Within Mexican spotted owl protected and restricted areas, the Mexican spotted owl standards and guidelines take precedence over the northern goshawk standards and guidelines. One or the other set of standards and guidelines apply to all forest and woodland communities but the Mexican spotted owl standards always take precedence in areas of overlap.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA, FSM 2670.31	The revised MSO recovery plan (FWS 2012) for MSO will be used. ESA (law) has the highest authority. FSM policy also directs that T&E guidance is the top priority. It is not clear if the 1988 plan direction was intended to be a ST or GD.
Goshawk	**ST under Management for goshawk habitat.** Establish, and delineate on a map, a post-fledgling family area that includes six nesting areas per pair of nesting goshawks for known nest sites, old nest sites, areas where historical data indicates goshawks have nested there in the past, and where goshawks have been repeatedly sighted over a two year or greater time period but no nest sites have been located.	**GDs for TES:** A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size. Goshawk PFAs (post-fledging family areas) of approximately 420 acres in size should be designated surrounding the nest sites.		Retained as a GD.

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Goshawk	**Forest wide ST under Management for goshawk habitat.** Survey the management analysis area prior to habitat modifying activities including a 1/2 mile beyond the boundary.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30. **Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		This is overly prescriptive at the forest plan level. Goshawk survey methods have evolved since the last plan was signed and new literature on goshawk ecology and behavior has been published. Survey needs will be determined on a project and site specific basis following established protocols as per the most recent scientific literature. Refer to GTR-WO-71.
Goshawk	**Forest wide GDs for goshawk inventories.** For areas where complete inventories cannot be done, use aerial photographs to locate vegetative structural stages (VSS) 4-6 within the project area and inventory just those sites for goshawk nest areas using R3 inventory protocol. All un-inventoried areas (VSS 1-3) will be managed to post-fledgling family area (PFA) specifications while in that stage. If, while using this inventory option, evidence suggests goshawks are present (such as finding plucking perches or molted goshawk feathers) conduct a complete inventory as outlined above.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		This is overly prescriptive at the forest plan level and uses outdated language, the new forest plan does not reference VSS classes. Goshawk survey methods have evolved since the last plan was signed and new literature on goshawk ecology and behavior has been published. Survey needs will be determined on a project and site specific basis following established protocols as per the most recent scientific literature. Refer to Gen. Tech. Rep. WO-71.

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Goshawk	**Forest wide GDs for goshawk inventories**. If forests have goshawks commonly nesting in stands classified as VSS 1-3, use the complete inventory methods for those areas. There may be situations where an area is classified as a VSS 3, based on the predominant VSS class, but in actuality a combination of VSS 4 & 5 predominate the area. For those situations, use the complete inventory methods.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Outdated language. The new forest plan does not reference VSS classes. Overly prescriptive at the plan level. Survey needs will be determined on a project and site specific basis following recent advances in science
Goshawk	**Forest wide ST for goshawk habitats.** Limit human activity in nesting areas during the breeding season.	**GDs for TES:** Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30.		Retained as a guideline with revised language.
Goshawk	**Forest wide GD for goshawk habitats.** Refer to USDA Forest Service General Technical Report RM-217 entitled "Management Recommendations for the Northern Goshawk in the Southwestern United States" for scientific information on goshawk ecology and management which provide the basis for the management guidelines. Supplemental information on goshawk ecology and management may be found in "The Northern Goshawk: Ecology and Management" published by the Cooper Ornithological Society as Studies in Avian Biology No. 16. In woodland forest cover types, use empirical data to determine desired habitat conditions.	**Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive as a plan level guideline, really more of a management approach. Information about goshawk needs continues to evolve as new science become available.

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Goshawk	**Forest wide GD for goshawk habitats.** Use the R3 survey protocol to get complete coverage of the management analysis area (Kennedy and Stahlecker 1993, as modified by Joy, Reynolds, and Leslie 1994.) Management analysis areas should be entire ecosystem management areas if possible. Complete at least one year of survey, but two years of survey should be done to verify questionable sightings, unconfirmed nest sites, etc. If nesting goshawks are found during the first year of inventory, a second year of inventory is not needed in that territory.	**Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive at the plan level, really more of a management approach. Survey needs will be determined on a project and site specific basis following the most recently established protocols and scientific literature. Region 3 has updated survey guidance (GTR-WO-71.
Goshawk	**Forest wide GD at the management scale**. Distribution of habitat structures (tree size and age classes, tree groups of different densities, snags, dead and down woody material, etc.) should be evaluated at the ecosystem management area level, at the mid-scale such as drainage, and at the small scale of site.	**Monitoring Plan Questions: 01 Ponderosa Pine and Frequent Fire Mixed Conifer:** Are snags, coarse woody debris, downed logs and large old trees at desired levels at the midscale (100-1,000 acre average)? **07 Ponderosa Pine and Frequent Fire Mixed Conifer:** How many acres of the Kaibab NF is in an uneven aged open state, at the midscale (above 100 acres)? **09 Ponderosa Pine and Frequent Fire Mixed Conifer:** Is the stand density within a range that will allow for a robust understory? **11 Ponderosa Pine and Frequent Fire Mixed Conifer:** What is the total area within the desired range for basal area and openings?		This is redundant guidance. This direction is built into the new plan as DCs and GDs under the relevant vegetation types at the landscape, mid and fine scales (see above). It is also covered under the monitoring plan.
Goshawk	**Forest wide GDs for goshawk home range.** Manage for nest replacement sites to attain sufficient quality and size to replace the three suitable nest sites.	**GDs for TES:** A minimum of six goshawk nest areas (known and replacement) should be located per territory. Nest and replacement nest areas should generally be located in drainages, at the base of slopes, and on northerly (NW to NE) aspects. Nest areas should generally be 25 to 30 acres in size.		Redundant guidance. Address above under nest areas.
Goshawk	**Forest wide GDs for goshawk home range**. Nest site selection will be based first on using active nest sites followed by the most recently used historical nest areas. When possible, all historical nest areas should be maintained.	**Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists		Overly prescriptive. Will vary by site and project.

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Goshawk	**Forest wide GDs outside PFAs**. The distribution of VSS, tree density, and tree age are a product of site quality in the ecosystem management area. Use site quality to guide in the distribution of VSS, tree density and tree ages. Use site quality to identify and manage dispersal PFA and nest habitat at 2 - 2.5 mile spacing across the landscape.	**PP Landscape-scale DC:** The ponderosa pine forest vegetation community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. The forest is generally uneven-aged and open. Groups of old trees are mixed with groups of younger trees. Occasional areas of even-aged structure are present. Denser tree conditions exist in some locations such as north-facing slopes, canyons, and drainage bottoms. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Frequent fire MC Landscape-scale DC.** At the landscape scale, the frequent fire mixed conifer forest community is a mosaic of forest conditions composed of structural stages ranging from young to old trees. Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists		This is redundant with guidance for nesting areas (already coved above under the different vegetation types) and overly prescriptive. It uses outdated language. The new plan does not reference VSS classes. Actual treatments prescriptions will vary by site and project but the landscape DCs would provide for habitat requirements including nesting across the landscape. Only goshawks truly know where they will nest.
Goshawk	**Forest wide GDs outside PFAs.** The order of preferred treatment for woody debris is: 1) prescribed burning, 2) lopping & scattering, 3) hand piling or machine grapple piling, 4) dozer piling.	**GDS for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists		Overly prescriptive as a plan level guideline. Appropriate methods will vary depending on the project, site conditions and available equipment.

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Goshawk	**Forest wide GDs within nesting areas.** Preferred treatments to maintain the desired structure are to thin from below with non-uniform spacing and use of handtools and fire to reduce fuel loads. Lopping and scattering of thinning debris is preferred if prescribed fire cannot be used. Piling of debris should be limited. When necessary, hand piling should be used to minimize compaction within piles and to minimize displacement and destruction of the forest floor and the herbaceous layer. Do not grapple or Dozer pile debris. Manage road densities at the lowest level possible to minimize disturbance in the nest area. Use small, permanent skid trails in lieu of roads for timber harvesting.	**GDs for TES:** Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30. **Wildlife Management Approach:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. **DCs for Vegetation Management in all Forested Communities:** Vegetation management activities in mixed conifer forests should incorporate experimental design features and monitoring to accelerate learning and adaptive management. **DCs for Wildland Fire Management:** Develop objectives and courses of action to address the desired conditions for wildlife habitat and key habitat features such as snags, logs, large tree-form oaks, and oak thickets. **Management Approach Ponderosa Pine:** Tools for creating desired stand conditions and openings include a variety of treatments and uneven-aged cutting methods such as matrix thinning, all-size free thinning, single tree selection, group selection, sanitation and salvage, limited even-aged regeneration cutting, thinning, and managed fire Also see **Management Approach** sections for Ponderosa Pine and Frequent Fire Mixed Conifer.		Overly prescriptive as a plan level guideline. In the new plan, treatment methods will reflect current science and methods and be adaptive as information about forest level management and associated effects changes over time.
Goshawk	**Forest wide GDs within nesting areas**. Limit dozer use for piling or scattering of logging debris so that the forest floor and herbaceous layer is not displaced or destroyed.	**GDs for Vegetation Management in all Forested Communities:** Vegetation management prescriptions should provide for sufficient canopy breaks to limit crown fire spread between groups, allow for the redevelopment and maintenance of a robust understory, and mimic the spatial arrangement of the reference conditions. Vegetation management should favor the development of native understory species in areas where they have the potential to establish and grow. **DCs for Ponderosa Pine and Frequent Fire Mixed Conifer (Fine-scale):** Organic ground cover and herbaceous vegetation provide protection for soil and moisture infiltration, and contribute to plant and animal diversity and ecosystem function. Herbaceous vegetation reflects the site potential. **DCs for Soils and Watersheds:** Soils provide for diverse native plant species. Vegetative ground cover is well distributed across the soil surface to promote nutrient cycling and water infiltration.		Overly prescriptive at the plan level. Appropriate methods will meet DCs and GDs for the vegetation communities and soil types.

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Goshawk	**Forest wide GDs for human disturbance.** Limit human activities in or near nest sites and post-fledgling family areas during the breeding season so that goshawk reproductive success is not affected by human activities.	**GDs for TES:** Potentially disturbing project-related activities should be minimized in occupied goshawk nest areas during nesting season of March 1 through September 30. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species.		Redundant guidance, mentioned in 3 different places within goshawk section of 1988 plan, mentioned as both a ST and a GD. Has been replaced by 2 unique but complementary guidelines in the TES section of the revised plan.
Goshawk	**Forest wide GDs for human disturbance.** Low intensity ground fires are allowed at any time in all forested cover types, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas. Avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildland Fire Management DC:** Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation community. Uncharacteristic high-severity fires rarely occur, and do not burn at the landscape scale. Develop objectives and courses of action to address the desired conditions for wildlife habitat and key habitat features such as snags, logs, large tree-form oaks, and oak thickets. **ST:** Managers will use a decision support process to guide and document wildfire management decisions. **GDs:** Decision documents, which define the objectives and document line officer approval of the strategies chosen for wildfires that progress past initial attack, should include interdisciplinary input to assess site-specific values at risk and develop incident objectives and courses of action to enhance or protect those values. At a minimum, the interdisciplinary team should: Identify smoke sensitive receptors, and identify appropriate objectives and courses of action to minimize and mitigate impacts to those receptors. Develop objectives and courses of action to address the desired conditions for wildlife habitat and key habitat features such as snags, logs, large tree-form oaks, and oak thickets. If current or anticipated fire behavior and fire effects exceed the desired fire behavior and effects, protection objectives should be developed for wildfires, or a more conservative prescription window should be produced for prescribed burns. Strategies and tactics to mitigate those effects should be implemented on active wildland fires.	FSM 5140.3, Interagency Prescribed Fire Planning and Implementation Guide (incorporated by reference). Guidance for the Implementation of Federal Wildland Fire Management Policy, 2009	Portions of this are overly prescriptive at the plan level and redundant with other direction.

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Goshawk	**Forest wide GDs for Ground Surface Layer**. Manage road densities at the lowest level possible. Where timber harvesting has been prescribed to achieve desired forest condition, use small, skid trails in lieu of roads.	**DCs for Transportation and Forest Access:** Forest roads, bridges, and trails provide safe, legal, and reasonable access for recreation opportunities and resource management. Resource impacts from roads and trails are balanced with the benefits of having the road or trail available for use. **OBJ:** Obliterate or naturalize 20 miles of nonsystem roads (unauthorized, decommissioned, etc.) within 10 years of plan approval. **GDs:** Construction of permanent roads or temporary roads in semiprimitive nonmotorized areas should be avoided unless required by a valid permitted activity. If authorized, roads should be constructed and maintained at the lowest maintenance level needed for the intended use. Roads should be decommissioned when no longer needed. Roads allow for safe and healthy wildlife movement in areas of human development.		The revised plan has more direction in the form of DCs, OBJs, and GDs than the existing plan.
Goshawk	**Forest wide GDs for Ground Surface Layer.** Piling of debris should be limited. When necessary, hand or grapple piling should be used to minimize soil compaction within piles and to minimize forest floor and herbaceous layer displacement and destruction.	**GDs for Soils and Watershed Management:** Projects should incorporate the national best management practices for water quality management and include design features to protect and improve watershed condition**. Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive. Addressed through DCs and GDs for Vegetation communities, soils and watersheds above.
Goshawk	**GDs for timber in EMAs 2, 10, 13.** In northern goshawk existing nest areas, the nesting area may be thinned from below removing suppressed and intermediate trees, using prescribed fire or hand operated tools.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. **Management Approach Ponderosa Pine**: Tools for creating desired stand conditions and openings include a variety of treatments and uneven-aged cutting methods such as matrix thinning, all-size free thinning, single tree selection, group selection, sanitation and salvage, limited even-aged regeneration cutting, thinning, and managed fire.		Overly prescriptive, will vary depending on project, site conditions and current science/available methods

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Goshawk	**GDs for timber in EMAs 2,10, 13.** In northern goshawk replacement nest areas, tree-groups may be thinned from below; removing, in order: (1) mistletoe infected, (2) suppressed, (3) intermediate, and (4) codominant individuals. Promote varied, irregular spacing between trees.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. **Management Approach Ponderosa Pine:** Tools for creating desired stand conditions and openings include a variety of treatments and uneven-aged cutting methods such as matrix thinning, all-size free thinning, single tree selection, group selection, sanitation and salvage, limited even-aged regeneration cutting, thinning, and managed fire.		Overly prescriptive, will vary depending on project, site conditions and current science/available methods
Goshawk	**GDs for timber in EMAs 2, 10, 13** In northern goshawk PFAs, preferred method for treating woody debris is, in order, prescribed burning fire use, lopping and scattering, hand piling, machine grapple piling, and lastly, crawler tractor piling.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive, will vary depending on project, site conditions and current science/available methods
Goshawk	**GDs for timber in EMAs 2,10, 13.** In northern goshawk replacement nesting areas, preferred method for treating woody debris is prescribed burning fire use, next, lopping and scattering, and last, hand piling. Avoid slash piling with crawler tractor.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive, will vary depending on project, site conditions and current science/available methods
Goshawk	**GDs for timber in EMAs 2,10, 13.** In northern goshawk suitable nesting areas, preferred method for treating woody debris is prescribed burning fire use, next lopping and scattering, and lastly, hand piling.	**DCs for TES:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Wildlife Management Approach**: The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists.		Overly prescriptive, will vary depending on project, site conditions and current science/available methods

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Goshawk	**Forest wide ST for goshawk.** When activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with US Fish and Wildlife Service to resolve the conflict.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Wildlife Management Approach:** The Kaibab NF works with the USFWS and other partners to develop conservation measures (e.g. public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species. For 10(j) species, such as the California condor, this applies inside and outside the designated experimental range.	ESA; 2670	ESA (law) requires consultation with USFWS for any activity that may affect any listed or proposed species. Redundant of law, regulation, and policy.
Goshawk	**Forest wide ST for goshawk**. Within the ranges of the Kaibab pincushion cactus, Pediocactus paradinei, and the Arizona leatherflower, Clematis hirsutissima arizonica, management activities needed for the conservation of these two species that may conflict with northern goshawk standards and guidelines will be exempt from the conflicting northern goshawk standards and guidelines until conservation strategies or recovery plans (if listed) are developed for the two species.	**Pediocactus Conservation area Management Approach:** Pediocactus paradinei is managed under a conservation assessment and strategy developed by the Forest Service, BLM, and USFWS (USDA et al. 1997). This document represents the desire to achieve self-sustaining populations of Pediocactus paradinei.	2670	There is a Pediocactus Conservation Strategy and Assessment (1997) now in place and it is currently being updated. Arizona leather flower was removed as a candidate species. Both species are sensitive species.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Lands	**Realty Management Direction for EMA 1.** Provide for efficient management of realty resources that responds to needs for special land uses, rights-of-way, adjustments to land ownership, and property corner and boundary establishment and maintenance. Provide timely evaluation, administration, and termination of special land uses. Minimize the amount of land allocated to electronic sites and utility corridors consistent with appropriate accommodation for these public services that can be met only on National Forest System lands. Acquire lands and interests in lands to provide consolidated land ownership, public and administrative access to National Forest Lands, and efficient resource management. Identify property corners and boundaries to protect National Forest landownership by detecting and resolving unauthorized land occupancy and trespass. Administer the Small Tracts Act to resolve trespass and improve and consolidate National Forest landownership.[49-51]	**DCs for Lands:** NFS lands exist in a pattern that promotes efficient management, which consists of large contiguous areas that provide efficient and effective resource management and wildlife connectivity within and across NFS lands. Lands identified for disposal and acquisition are displayed on the land adjustment map. **DCs for Special Uses:** Special use permits support and contribute to the Kaibab National Forest and district niches. Permanent structures associated with special uses are concentrated on existing sites or designated corridors, minimizing the number of acres encumbered by special use authorizations.	FSM 5470, FSM 7150 FSH 5509, FSH 2709	It is unclear in the 1988 plan what type of direction this is. It is neither ST nor GD.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Lands	**Guidelines for Realty Operations and Improvements in EMAs 2, 10, 13**: On lands designated as base-in-exchange: a. Limit capital investments in range structural or non-structural improvements, recreation improvements, administrative improvements, or timber stand improvements, etc, to those that can be amortized during the anticipated period of continued government ownership. b. Design heritage practices, such as timber sales, to protect or enhance real estate values by modifying marking prescriptions to retain a component of mature trees, ensuring timely disposal of activity slash and in designing location of permanent roads. c. Avoid, where possible, the authorization of encumbering special uses that detrimentally effect real estate values and, where possible, locate those that must be accommodated in a manner to minimize impacts to the value of real estate. [39-46]		FSM 5402, 5403.1, 5450.2	This direction in the 1988 plan is covered by current policy and regulations and not carried forward in the revised plan
Lands	**Realty Management Direction for EMA 8:** Administer the Small Tracts Act to resolve trespass and improve and consolidate National Forest land ownership. [56-57]		Small Tracts Act	It is unclear if this is a ST or GD under the 1988 plan. This is direction is covered by the law and not carried forward in the revised plan.
Lands	**Management Direction for right-of-way grants for roads and trails EMA 6:** Issue only right-of-way grants that contribute to the management goals of the area.		FSM 2730.3	It is unclear if this is a ST or GD under the 1988 plan. This direction is covered by current policy and regulations and not carried forward in the revised plan

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Lands	**Management Direction for right-of-way grants for roads and trails EMA 7:** Issue only right-of-way grants that contribute to the management goals of the area.		FSM 2730.3	It is unclear if this is a ST or GD under the 1988 plan. This direction is covered by current policy and regulations and not carried forward in the revised plan
Minerals	**GDs for Minerals EMAs 2, 10, 13.** Impose the following operating constraints on locatable mineral prospecting and exploration activities to maintain wildlife habitat components and visual and special resource objectives: a. Restrict surface use and occupancy yearlong in foreground of heritage resource sites with National Register status.	**STs for Mining and Minerals:** Surface use and occupancy is restricted within foreground of heritage resource sites nominated or listed on the National Register of Historic Places. Construction of oil and gas well surface facilities within foreground of heritage resource sites with National Register status and in the visible foreground of State highways is prohibited. **GDs:** Surface use should be restricted or prohibited in areas with habitat for threatened, endangered, and sensitive plant and animal species, and for heritage resources nominated or listed on the National Register of Historic Places. Use and occupancy should be restricted yearlong in areas supporting populations of threatened, endangered, and sensitive plant species.		GDs in existing plan elevated to STs in new plan.
MSO	**Forest wide GDs for MSO.** The activity center is defined as the nest site. In the absence of a known nest, the activity center should be defined as a roost grove commonly used during breeding. In the absence of a known nest or roost, the activity center should be defined as the best nest/roost habitat.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	This is a definition, not a GD. Not in revised plan glossary but see revised MSO recovery plan for most current working definition (FWS 2012)
MSO	**Forest wide ST for MSO.** Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and restricted areas.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See most current MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide ST for MSO.** Protected areas include delineated protected activity centers; mixed conifer and pine-oak forests with slopes greater than 40% where timber harvest has not occurred in the last 20 years; and reserved lands which include wilderness, research natural areas, wild and scenic rivers, and congressionally recognized wilderness study areas.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See most current MSO RP (FWS 2012) for current definition of protected habitat.
MSO	**Forest wide ST for MSO.** Restricted areas include all mixed-conifer, pine-oak, and riparian forests outside of protected areas.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See most current MSO RP (FWS 2012)
MSO	**Forest wide ST for MSO.** Survey all potential spotted owl areas including protected, restricted, and other forest and woodland types within an analysis area plus the area 1/2 mile beyond the perimeter of the proposed treatment area.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See most current MSO RP Survey Protocol (Appendix D in the revised RP, FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Management direction for MSO.** As the foregoing example shows, the guidelines are the detailed information about implementation of the standards. While standards and guidelines both specify the management bounds and constraints, the standards contain no discretionary elements and the guidelines may occasionally contain discretionary elements. For example one of the Mexican spotted owl guidelines is "The Protected Activity Center should enclose the best possible owl habitat...". The terms "should" and "best" imply some discretion on the part of the person implementing the guideline.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Descriptive information, not necessary in forest plan. Is not neither ST nor GD. See MSO RP (FWS 2012).
MSO	**Management direction for MSO.** Submit protected activity center maps and descriptions to the recovery unit working group for comment as soon as possible after completion of surveys.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Revised MSO RP updated with most current procedures (FWS 2012) Is not neither ST nor GD.
MSO	**Forest wide ST for MSO.** Provide three levels of habitat management - protected, restricted, and other forest and woodland types to achieve a diversity of habitat conditions across the landscape.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	This language is outdated and inconsistent with revised MSO RP (FWS 2012).

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide ST for MSO.** Establish a protected activity center at all Mexican spotted owl sites located during surveys and all management territories established since 1989.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir**: Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA	This language is outdated and unclearly written. There have been no more management territories established since 1989, only PACs.
MSO	**Forest wide ST for MSO.** Allow no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40%where timber harvest has not occurred in the last 20 years.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	This language is outdated and inconsistent with revised MSO RP (FWS 2012).

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide STs for MSO.** Allow no timber harvest except for fuelwood and fire risk abatement in established protected activity centers. For protected activity centers destroyed by fire, windstorm, or other natural disaster, salvage timber harvest or declassification may be allowed after evaluation on a case-by-case basis in consultation with US Fish and Wildlife Service. Limit human activity in protected activity centers during the breeding season. In protected and restricted areas, when activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with US Fish and Wildlife Service to resolve the conflict. Monitor changes in owl populations and habitat needed for de-listing.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine.** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir:** Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA , FSM 2670.31	This language is outdated and inconsistent with revised MSO RP (FWS 2012). ESA (law) requires consultation with USFWS for any activity that may affect any listed or proposed species. Redundant of law, regulation, and policy

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO.** Breeding season is March 1 to August 31. Conduct surveys following Region 3 survey protocol.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir:** Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA	See revised MSO RP (FWS 2012)
MSO	**Forest wide GD for MSO in PACs**. Delineate an area of not less than 600 acres around the activity center using boundaries of known habitat polygons and/or topographic features. Written justification for boundary delineation should be provided.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir:** Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA	See revised MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in PACs.** Generally allow continuation of the level of recreation activities that was occurring prior to listing.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine:** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir:** Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA	Existing GD reads more as a Management Approach.
MSO	**Forest wide GD for MSO in PACs.** Protected Activity Center boundaries should not overlap.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.		See revised MSO RP (FWS 2012)
MSO	**Forest wide GD for MSO in PACs.** Require bird guides to apply for and obtain a special use permit. A condition of the permit shall be that they obtain a sub-permit under the U.S. Fish and Wildlife Service Master endangered species permit. The permit should stipulate the sites, dates, number of visits and maximum group size permissible.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See revised MSO RP (FWS 2012)
MSO	**Forest wide GD for MSO in PACs.** Road or trail building in protected activity centers should be avoided but maybe permitted on a case-by-case basis for pressing management reasons.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.		See revised MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in PACs.** Harvest fuelwood when it can be done in such a way that effects on the owl are minimized. Manage within the following limitations to minimize effects on the owl: Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below. Designate a 100 acre "no treatment" area around the known nest site of each selected protected activity center. Habitat in the no treatment area should be as similar as possible in structure and composition as that found in the activity center. Retain key forest species such as oak. Retain key habitat components such as snags and large downed logs.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach Ponderosa Pine:** Illegal wood cutting is probably the biggest threat to oak, as it reduces both the amount and quality of oak habitat. Enforcement, education, and site-specific planning will be necessary to ensure quality oak habitat over the long term. Firewood collection opportunities are managed so site-specific planning and permits may specify the amount and size of oak that can be collected in areas where live and dead woody oak habitat components are limited. **GDs for Personal Firewood Collection:** The following should be permitted for personal use firewood gathering: Dead and downed ponderosa pine, Douglas-fir, white fir, spruce, juniper, pinyon pine, Gambel oak, and aspen. Standing dead: Ponderosa pine, Douglas-fir, white fir, or spruce less than 12 inches d.b.h. or less than 15 feet in total height Juniper without green foliage, Pinyon pine less than 12 inches diameter at root collar (d.r.c.) or less than 12 feet in height, Gambel oak less than 8 inches d.r.c., Aspen less than 12 inches d.b.h. Live trees specifically designated by the Forest Service.	ESA	Part of this language is outdated and inconsistent with revised MSO RP (FWS 2012).
MSO	**Forest wide GD for MSO in PACs.** No seasonal restrictions apply. Treat fuel accumulations to abate fire risk.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	See revised MSO RP (FWS 2012)
MSO	**Forest wide GD for MSO in PACs.** Pre and post treatment monitoring should occur within all steep slopes treated for fire risk abatement. (See monitoring guidelines)	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Revised RP had new monitoring requirements.
MSO	**Forest wide GD for MSO in PACs.** Pre- and post-treatment monitoring should be conducted in all protected activity centers treated for fire risk abatement. (See monitoring guidelines)	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Revised RP had new monitoring requirements.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in PACs.** Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas). Allow prescribed fire where appropriate.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	These areas no longer protected habitat in revised MSO RP.
MSO	**Forest wide GD for MSO in PACs.** Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood tress larger than 10 inches in diameter at the root collar.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **DC Ponderosa Pine (Mid-scale):** Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average 3 logs per acre. Coarse woody debris greater than 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. **(Land-scape scale):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. **DC Mixed Conifer (Fine-scale):** Snags and green snags 18 inches d.b.h. or greater average three per acre. Downed logs (greater than 12 inches diameter at mid-point and greater than 8 feet long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. **(Landscape-scale):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. **DC Mesic Mixed Conifer/Spruce Fir (Mid-scale):** The number of snags and downed logs (greater than 12 inches diameter at mid-point, over 8 feet long) and coarse woody debris (greater than 3 inches diameter) vary by seral stage. Snags 18 inches or greater d.b.h. typically range from one to five snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late seral stages. **(Landscape-scale):** Old growth generally occurs over large areas as stands or forests. Old growth includes old trees, snags, coarse woody debris, and structural diversity.	ESA	Revised as forest wide guidance for relevant vegetation types. Consistent with MSO RP.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in PACs.** Select and treat additional protected activity centers in 10% increments if monitoring of the initial sample shows there were no negative impacts or there were negative impacts which can be mitigated by modifying treatment methods.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Revised RP had new monitoring requirements.
MSO	**Forest wide GD for MSO in PACs.** Select for treatment 10% of the protected activity centers where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10% of the protected activity centers where nest sites are known as a paired sample to serve as control areas.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Revised RP had new monitoring requirements.
MSO	**Forest wide GD for MSO in Protective Habitat**. Steep Slopes (Mixed conifer and pine-oak forests outside protected activity centers with slopes greater than 40% that have not been logged within the past 20 years)	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Inconsistent with revised MSO RP direction
MSO	**Forest wide GD for MSO in PACs.** Treat fuel accumulations to abate fire risk.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **OBJ for Ponderosa Pine**: To make progress toward the desired conditions and reduce the potential for active crown fire in ponderosa pine communities at a rate that would maintain the desired conditions over time: Mechanically thin 11,000 to 19,000 acres annually. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. **OBJ. Vegetation Management in Frequent Fire MC:** To reduce the potential for active crown fire and restore frequent fire mixed conifer communities: Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually.	ESA	See revised MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in PACs.** Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire to abate fire risk in the remainder of the selected protected activity center outside the 100 acre "no treatment" area.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Inconsistent with revised MSO RP direction
MSO	**Forest wide GD for MSO in PACs**. Use light prescribed burns in non-selected protected activity centers on a case-by-case basis. Burning should avoid a 100 acre "no treatment" area around the activity center. Large woody debris, snags, clumps of broad-leafed woody vegetation should be retained and hardwood trees larger than 10 inches diameter at the root collar.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Inconsistent with revised MSO RP direction

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**Forest wide GD for MSO in Restricted Areas.** Attempt to mimic natural disturbance patterns by incorporating natural variation, such as irregular tree spacing and various patch sizes, into management prescriptions. Maintain all species of native trees in the landscape including early seral species. Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure. Emphasize uneven-aged management systems. However, both even-aged and uneven-aged systems may be used where appropriate to provide variation in existing stand structure and species diversity. Existing stand conditions will determine which system is appropriate.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **GDs for Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Even aged silvicultural practices may be used as a strategy for achieving the desired conditions over the long term, such as bringing dwarf mistletoe infection levels to within a sustainable range, or old tree retention. **Management Approach**: On the Kaibab NF, the predominate vegetation management strategies are uneven-aged management systems. This is because vegetation management objectives were only developed for the ponderosa pine and frequent fire vegetation types, both of which have uneven aged desired conditions. Even aged management prescriptions are, however, used as a strategy for achieving the desired uneven-aged conditions over the long term. Even-aged prescriptions are appropriate when they would increase or maintain a trajectory toward desired conditions such as to regenerate aspen or when mistletoe infections are moderate to severe and the ability of the area to achieve the desired conditions would be significantly impaired. **Also see DCs for Ponderosa Pine, Frequent Fire MC, and Mesic MC/Spruce Fir.**	ESA	Restricted is not a designation with revised MSO RP. See revised MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Restricted (MC, Pine oak, and Riparian)** Manage to ensure a sustained level of owl nest/roost habitat well distributed across the landscape. Create replacement owl nest/roost habitat where appropriate while providing a diversity of stand conditions across the landscape to ensure habitat for a diversity of prey species.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **DC Ponderosa Pine (Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, drainages, and steep north-facing slopes). **DC Frequent Fire MC (Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, and north-facing slopes. Interspaces with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. **DC Mesic MC/Spruce Fir (Mid-scale):** Forest conditions in some areas contain higher basal area than the general Forest; examples include goshawk post-family fledgling areas, Mexican spotted owl nesting and roosting habitat, and north-facing slopes. **Management Approach Ponderosa Pine:** Pine-oak forests are managed as Mexican spotted owl (*Strix occidentalis lucida*) habitat as discussed under the approved revised Recovery Plan for the Mexican Spotted Owl (2012). The Kaibab NF works closely with the U.S. Fish and Wildlife Service (USFWS) to address the habitat needs of the Mexican spotted owl by minimizing disturbance and providing nest/roost habitat, which includes managing for areas of closed canopy and desired levels of key structural elements such as large old trees, snags, and downed woody debris. **Management Approach Frequent Fire Mixed Conifer and Mesic Mixed Conifer/Spruce Fir :** Forest is managed as Mexican spotted owl habitat under the approved "Mexican Spotted Owl Recovery Plan, First Revision" (USFWS 2012). The Kaibab NF works closely with the USFWS to address the habitat needs of Mexican spotted owls by minimizing disturbance, providing for some areas of denser forest, and managing for desired levels of key structural elements (e.g., large old trees and snags, downed woody debris) important for nesting, foraging, and dispersal.	ESA	Restricted is not a designation with MSO RP. See revised MSO RP (FWS 2012)

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Restricted (Nest/Roost).** The following table displays the minimum percentage of restricted area which should be managed to have nest/roost characteristics. The minimum mixed conifer restricted area includes 10% at 170 basal area and an additional 15% of area at 150 basal area. The variables are for stand averages, are minimum threshold values and must be met simultaneously. In project design, no stands simultaneously meeting or exceeding the minimum threshold values should be reduced below the threshold values unless a district-wide or larger landscape analysis of restricted areas shows that there is a surplus of restricted area acres simultaneously meeting the threshold values. Management should be designed to create minimum threshold conditions on project areas where there is a deficit of stands simultaneously meeting minimum threshold conditions unless the district-wide or larger landscape analysis shows there is a surplus. Table 13. Minimum Percentage of Restricted Area Managed for Nest/Roost Characteristics	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Restricted is not a designation in revised MSO RP, See tables C1-C2 in revised MSO RP for current allocations.
MSO	**GDs for MSO Restricted (MC, Pine oak, and Riparian).** Encourage prescribed and prescribed natural wildland fire use to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Restricted is not a designation in revised MSO RP, See tables C1-C2 in MSO RP for current allocations.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Restricted (MC, Pine oak, and Riparian)**. Extend rotation ages for even-aged stands to greater than 200 years. Silvicultural prescriptions should explicitly state when vegetative manipulation will cease until rotation age is reached.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Restricted is not a designation in revised MSO RP, See tables C1-C2 in MSO RP for current allocations.
MSO	**GDs for MSO Restricted (MC, Pine oak, and Riparian**).In pine-oak forests, retain existing large oaks and promote growth of additional large oaks.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **GDs Vegetation Management in all Forested Communities:** Project design and treatment prescriptions should generally not remove: Gambel oak >8 inches, diameter at root collar. **DC Ponderosa Pine (Fine-scale):** Where historically occurring, Gambel oak thickets with various diameter stems and low growing, shrubby oak are present. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Gambel oak mast (acorns) provides food for wildlife species. Large tree form oaks, snags, and partial snags with hollow boles or limbs are present. Where Gambel oak comprises more than 10 percent of the basal area, it is not uncommon for canopy cover to be greater than 40 percent.		Restricted is not a designation in revised MSO RP, See tables C1-C2 in MSO RP for current allocations.
MSO	**GDs for MSO Restricted (MC, Pine oak, and Riparian).**Retain substantive amounts of key habitat components: Snags 18 inches in diameter and larger down logs over 12 inches midpoint diameter hardwoods for retention, recruitment, and replacement of large hardwoods. Save all trees greater than 24 inches dbh.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **GDs Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). Large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter). Gambel oak >8 inches, diameter at root collar. **PP DCs mid-scale:** Snags 18 in diameter at d.b.h. or greater average 1 to 2 snags per		All the language is not consistent with the revised MSO RP. See revised MSO RP, See tables C1-C2 in MSO RP for current allocations.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
		acre. Snags and green snags of various sizes and forms are common. Downed logs (> 12 in diameter at mid-point, over 8 ft long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris > 3 inches in diameter (including downed logs), ranges from 3 to 10 tons per acre. **Frequent Fire MC DCs mid-scale:** Snags and green snags, 18 in d.b.h. or greater average 3 per acre. Downed logs (> 12 in diameter at mid-point, over 8 ft long) average three per acre within the forested area of mid-scale units. Coarse woody debris, including downed logs, ranges from 5 to 15 tons per acre. **PP and Frequent Fire MC DCs landscape scale:** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **Mesic MC DC mid-scale:** The number of snags and downed logs (> 12 in diameter at mid-point, over 8 ft long) and coarse woody debris (> 3 inches diameter) vary by seral stage. Snags 18 in or greater at d.b.h. typically range from 1 to 5 snags per acre, with the lower range associated with early seral stages and the upper range associated with late seral stages. Coarse woody debris, including downed logs, vary by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late seral stages. **Also see Management Approach sections under Ponderosa Pine, Frequent Fire Mixed Conifer, and Mesic Mixed Conifer/Spruce Fir.**		

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO in Riparian Areas.** Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.	**Reframed as an OBJ under Natural Waters**: Protect and/or restore at least 10 individual springs within 5 years of plan approval. **DCs Natural Waters:** Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. The necessary physical and biological components, including cover, forage, water, microclimate, and nesting/breeding habitat, provide habitat for a diverse community of plant and wildlife species. **DCs Wetlands/Cienegas:** Wetland conditions are consistent with their flood regime and flood potential. Wetlands infiltrate water, recycle nutrients, resist erosion, and function properly. **OBJ:** Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval. **DCs for Cottonwood-willow Riparian Forest:** The extent, diversity, and condition of riparian habitat contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. Water flow regime approximates reference conditions (i.e., perennial flows) and flows freely. Sedimentation is minimized. Springtime flooding contributes to ecosystem sustainability by optimizing germination conditions for seedlings and/or suckering opportunities from the parent plant.		Much of this guidance is redundant with riparian direction. Also see comments for riparian habitat in goshawk habitat above.
MSO	**GDs for MSO Old growth.** Except where otherwise noted, implement forest plan old growth standards and guidelines to maintain and promote development of owl habitat.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Redundant with old growth direction.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Other Forest and Woodland**. Apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old-growth standards and guidelines.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **DC Ponderosa Pine (Land-scape scale):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **DC for all Pinyon-Juniper Communities:** Pinyon-juniper communities occur as a shifting mosaic interspersed with openings across the landscape. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). The mature groups of trees are structurally diverse, containing large live trees, as well as trees with dead or broken tops, gnarls, and burls. Snags, green snags, and downed trees > 10″ at root collar are present and average 1 to 2 per acre. Some tree groups have 30 to 40 percent canopy cover that provides habitat for nesting, bedding, and foraging.	ESA	Revised as DCs.
MSO	**GDs for MSO Livestock Grazing**. Implement forest plan forage utilization standards and guidelines to maintain owl prey availability, maintain potential for beneficial fire while inhibiting potential destructive fire, maintain and restore riparian ecosystems, and promote development of owl habitat. Strive to attain good to excellent range conditions.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **DCs for Livestock Grazing:** Livestock use is consistent with other desired conditions.	ESA	Now done through site-specific range NEPA on allotments and annual operating instructions.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Monitoring.** Monitoring and evaluation should be collaboratively planned and coordinated with involvement from each national forest, USFWS Ecological Services Field Office, USFWS Regional Office, USFS Regional Office, Rocky Mountain Research Station, recovery team, and recovery unit working groups. Population monitoring should be a collaborative effort with participation of all appropriate resource agencies. Habitat monitoring of gross habitat changes should be a collaborative effort of all appropriate resource agencies. Habitat monitoring of treatment effects (pre and post treatment) should be done by the agency conducting the treatment. Prepare an annual monitoring and evaluation report covering all levels of monitoring done in the previous year. The annual report should be forwarded to the Regional Forester with copies provided to the recovery unit working groups, USFWS Ecological Services field offices, and the USFWS Regional Office.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Management Approach for TES:** The Kaibab NF maintains strong partnerships between the State, other federal agencies, academia, and nongovernment organizations to provide for TES species. Emphasis is placed on the protection and replacement of key habitats that contain threatened, endangered, and/or sensitive species of plants and animals. The Kaibab NF works with the USFWS and other partners to develop conservation measures (e.g. public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species. For 10(j) species, such as the California condor, this applies inside and outside the designated experimental range.	ESA	As written, this direction reads more as a management approach. MSO RP (2012) highlights strategies for monitoring and collaboration.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Monitoring Rangewide.** Track gross changes in acres of owl habitat resulting from natural and human caused disturbances. Acreage changes in vegetation composition, structure, and density should be tracked, evaluated, and reported. Remote sensing techniques should provide an adequate level of accuracy. In protected and restricted areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre and post treatment to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.	**Relevant Monitoring Plan Questions**: **01 Ponderosa Pine and Frequent Fire Mixed Conifer:** Are snags, coarse woody debris, downed logs and large old trees at desired levels at the midscale (100-1,000 acre average)? **07 Ponderosa Pine and Frequent Fire Mixed Conifer:** How many acres of the Kaibab NF is in an uneven aged open state, at the midscale (above 100 acres)? **15 Fire Adapted Ecosystems** How many acres were burned with desired and undesired fire behavior and effects? **16 Fire Adapted Ecosystems** How many acres were treated with mechanical thinning by PNVT? **GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	Has been modified from a GD to monitoring questions to better reflect effectiveness monitoring of the revised forest plan and to support the revised MSO RP (FWS 2012).

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
MSO	**GDs for MSO Monitoring Upper Gila RUs.** Assist the recovery team and recovery unit working group to establish sampling units consisting of 19 to 39 square mile quadrats randomly allocated to habitat strata. Quadrats should be defined based on ecological boundaries such as ridge lines and watersheds. Quadrat boundaries should not traverse owl territories. Twenty percent of the quadrats will be replaced each year at random. Using the sample quadrats, monitor the number of territorial individuals and pairs per quadrat; reproduction; apparent survival; recruitment; and age structure. Track population density both per quadrat and habitat stratum.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans.	ESA	This is outdated. The Recovery team has determined this sampling strategy to be unfeasible and it has been replaced with new monitoring design. The revised MSO RP speaks to new approaches for monitoring and evaluation.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Old Growth	**Forest wide ST for Old Growth**. Until the forest plan is revised, allocate no less than 20 percent of each forested ecosystem management area to old growth as depicted in the table below. In the long term, manage old growth in patterns that provide for a flow of functions and interactions at multiple scales across the landscape through time. Allocations will consist of landscape percentages meeting old growth conditions and not specific acres.	**GDs for Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. **DC Ponderosa Pine and Frequent Fire Mixed Conifer (Landscape scale):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **DCs Mesic Mixed Conifer/Spruce Fir:** Old growth generally occurs over large areas as stands or forests. Old growth includes old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **DCs All Pinyon-juniper Communities:** Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).		Percentage allocations overly prescriptive and outdated as per revised forest plan. This is now captured by DCs. EMAs are no longer a relevant designation under the revised plan. Under the new plan, the forest is managed through a more holistic approach.
Old Growth	**Forest wide GD for Old Growth.** Strive to create or sustain as much old growth compositional, structural, and functional flow as possible over time at multiple-area scales. Seek to develop or retain old growth function on at least 20 percent of the naturally forested area by forest type in any landscape.	**GDs for Vegetation Management in all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time		Reiterates similar MSO and goshawk direction in the 1988 plan.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Old Growth	**Forest wide GD for Old Growth.** Use quantitative models at the appropriate scales when considering the importance of various factors. These models may include, but are not limited to: Forest Vegetation Simulator, BEHAVE, and FARSITE. Forested sites should meet or exceed the structural attributes to be considered old growth in the five primary forest cover types in the southwest as depicted in the following table. Table 15. Old Growth Habitat Characteristics	Relevant Monitoring Plan Questions: **01 Ponderosa Pine and Frequent Fire Mixed Conifer:** Are snags, coarse woody debris, downed logs and large old trees at desired levels at the midscale (100-1,000 acre average)?		Prescriptive and outdated. See glossary for description of southwestern old growth. Attributes now captured by DCs and guidelines. Will be monitored through relevant monitoring plan questions. Specialists determine best methods to use at the project level.
Old Growth	**Forest wide GD for Old Growth.** All analyses should be at multiple scales - one scale above and one scale below the ecosystem management areas. The amount of old growth can be provided and maintained will be evaluated at the ecosystem management area level and be based on forest type, site capability, and disturbance regimes.	**See the DC for the Vegetation Communities Types and the introduction section that discusses scale.**		Prescriptive. Project specialists determine scales of analyses keeping Forest-wide DCs in mind. The DCs in the revised forest plan are designed to account for scale (fine, mid, and landscape).
Old Growth	**Forest wide GD for Old Growth.** Consider the effects of spatial arrangement on old growth function, from groups to landscapes, including de facto allocations to old growth such as goshawk nest sites, Mexican spotted owl protected activity centers, sites protected for species behavior associated with old growth, wilderness, research natural areas, and other forest structures managed for old growth function.	**DC Ponderosa Pine (Mid-scale):** The ponderosa pine forest vegetation community is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages present. Stands are dominated by ponderosa pine, but other native hardwood and conifer species occur. The more biologically productive sites contain more trees per group and more groups per area. Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest (e.g., *goshawk* post-fledging family areas, *Mexican spotted owl* nesting/roosting habitat, drainages, and steep north-facing slopes). **(Land-scape):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the		Redundant with much of the goshawk and MSO direction in the 1988 plan.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
		landscape over time as a result of succession and disturbance (tree growth and mortality). **DC Frequent Fire Mixed Conifer (Mid-scale):** Forest conditions in some areas contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in the general forest; these include goshawk post-fledging family areas, Mexican spotted owl nesting/roosting habitat, and north-facing slopes. Interspaces with native grass, forb, and shrub vegetation typically range from 10 to 50 percent of the area. **(Landscape scale):** Old growth occurs throughout the landscape, generally in small areas as individual old growth components, or as clumps of old growth. Old growth components include old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Mesic MC/Spruce Fire **(Mid-scale)** Forest conditions in some areas contain higher basal area than the general Forest; examples include goshawk post-family fledgling areas, Mexican spotted owl nesting and roosting habitat, and north-facing slopes. **(Landscape scale):** Old growth generally occurs over large areas as stands or forests. Old growth includes old trees, snags, coarse woody debris, and structural diversity. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **DC Pinyon-juniper Communities**: Old growth occurs throughout the landscape, generally in small areas as individual components, or as clumps. The location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). **GDs for Vegetation Management all Forested Communities:** Projects in forested communities that change stand structure should generally retain at least historic frequencies of trees by species across broad age and diameter classes at the mid-scale. As such, the largest and oldest trees are usually retained. Project design should manage for replacement structural stages to assure continuous representation of old growth over time. Project design and treatment prescriptions should generally not remove: Large, old ponderosa pine trees with reddish-yellow, wide platy bark, flattened tops, with moderate to full crowns and large drooping or gnarled limbs (e.g. Thomson's age class 4, Dunning's tree class 5 and/or Keen's Tree Class 4, A and B [appendix C]). Large snags, partial snags, and trees (>18 inches d.b.h.) with broken tops, cavities, sloughing bark, lightning scars >4 inches wide, and large stick nests (>18 inches in diameter).		

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Old Growth	**Forest wide GD for Old Growth.** In allocating old growth and making decisions about old growth management, use appropriate information about the relative risks to sustaining old growth function at the appropriate scales, due to natural and human-caused events.	**See the DC for the Vegetation Communities Types, management approach for the vegetation communities, and the introduction section that discusses scale.**		
Range	**Forest wide ST for Grazing.** Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.	**DC for TES:** Threatened, endangered, and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation. **GDs:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. **Livestock grazing DC:** Grasses and forbs provide adequate forage for permitted livestock consistent with other desired conditions. **Monitoring Plan Question 46 Livestock Grazing:** Are livestock numbers balanced with forage capacity on each allotment?		Replaced by several DCs and GDs. See revised MSO RP (USDA 2012)
Range	**Forest wide GDs for Grazing.** Identify key ungulate forage monitoring areas. These key areas will normally be 1/4 to 1 mile from water, located on productive soils on level to intermediate slopes, and be readily accessible for grazing. Size of the key forage monitoring areas could be 20 to 500 acres. In some situations such as high mountain meadows with perennial streams, key areas may be closer than 1/4 mile from water and less than 20 acres. Within key forage monitoring areas, select appropriate key species to monitor average allowable use.	**DC Livestock Grazing:** Grasses and forbs provide adequate forage for permitted livestock consistent with other desired conditions. **GDs for Livestock Grazing:** Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.). Livestock use in and around wetlands should be evaluated on an allotment specific basis. Mitigation measures such as deferment and fencing (full or partial) should be implemented as needed to minimize potential livestock effects. **Monitoring Plan Question 46 Livestock Grazing:** Are livestock numbers balanced with forage capacity on each allotment?	FSH 2209 14.40	Allotment management Plans would address forage monitoring (through NEPA process) on site specific basis

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Range	**GDs for Rangeland Improvements in EMAs 2, 10, 13.** In pronghorn antelope range, remove net wire fences; in the interim, modify every one-half mile of such fence to facilitate movement.	**DCs for Livestock Grazing:** Allotment fencing allows for passage of animals susceptible to movement restrictions such as pronghorn. **OBJ** Modify fences and/or install crossings to facilitate pronghorn movement on 50 miles of fence within 10 years of plan approval. **GDs:** New construction and reconstruction of fences should have a barbless bottom wire that is at least 18 inches high. **Monitoring Plan Question 21 Grasslands:** How many miles of fence were modified for pronghorn?		Revised as forest wide guidance. Redundant with structural improvement direction for pronghorn above.
Recreation	**GDs for Recreation and Improvements EMAs 2, 10, 13.** Formulate and implement control measures where and when the following damage occurs: a. Soil compaction. b. Loss of vegetative cover. c. Tree damage and mortality. d. Deterioration of water quality.	**GDs for Soils and Watersheds:** Projects should incorporate the national best management practices for water quality management and include design features to protect and improve watershed condition. In disturbed areas, erosion control measures should be implemented to improve soil conditions. Seeds and plants used for revegetation should originate from the same PNVT and general ecoregion (i.e. southern Colorado Plateau) as the project area.	FSM 2509.18; FSH 2509.22	Language for the GD was updated in the revised plan.
Soil and Water	**Forest wide GOALS for Riparian:** Woody riparian communities and riparian communities dominated by shrub and herbaceous species shall be in satisfactory or better condition.	**DC Cottonwood Willow Riparian:** The extent, diversity, and condition of riparian habitat contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. **Management Approach:** Program managers work with public affairs to communicate the ecological significance of these systems to the broader public and to garner support for restoration activities, which may facilitate increasing water into these systems. Increased capacity and broad support may be gained through partnerships. Work with various stakeholders, including the Kaibab Band of Paiute Tribe to restore cottonwood-willow riparian vegetation communities.	FSM 2202.1; 2522; 2526	Neither ST nor GD under 1988 plan. Translates into a DC for the revised plan.
Soil and Water	**Forest wide GOALS for Riparian:** Inventory all riparian areas (collect data regarding location, size, classification and condition of the riparian).	**DC for Natural Waters:** The location and status of springs and water resources are known, organized, and available. **GDs:** Forest springs information should be maintained in a database that facilitates long-term archiving, easy data entry, and comparison with monitoring results.	FSM 2511.1; 2526.02; 2526.03; 2527; 2532.03	Neither ST nor GD under 1988 plan. Translates into a DC for the revised plan.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Soil and Water	**Forest wide GOAL for Soils, Water, Air Quality:** Rehabilitate non-productive lands on a planned basis to eliminate unsatisfactory watershed condition by 2020.	**DCs for Watersheds:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, and gully erosion, and subsequent sedimentation into connecting waters downstream is minimal. The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance. **GDs for Soils and Watershed Management:** Projects should incorporate the national best management practices for water quality management and include design features to protect and improve watershed condition. **OBJ for Ponderosa Pine**: Mechanically thin 11,000 to 19,000 acres annually. Treat an average of 13,000 to 55,000 acres annually, using a combination of prescribed fire and naturally ignited wildfires. **OBJ for Frequent Fire Mixed Conifer:** Burn an average of 1,000 to 13,000 acres annually, using prescribed fire and/or naturally ignited wildfires. Mechanically thin 1,200 to 2,100 acres annually.	FSM 2510.2; 2522.1; 2532.03; 2526.03	Neither ST nor GD under 1988 plan. Translates into a DC for the revised plan.
Soil and Water	**Monitoring Plan for Soils, Water, Air Quality.** Expected Future Condition: Improved watershed conditions through reduction in the amount of watershed in unsatisfactory condition.	**DCs Watersheds:** Vegetation conditions within watersheds contribute to downstream water quality and quantity. Surface runoff, sheet, rill, and gully erosion, and subsequent sedimentation into connecting waters downstream is minimal. Flooding maintains normal stream characteristics (e.g., water transport, sediment, woody material) and dimensions (e.g., bankfull width, depth, slope, and sinuosity). Vertical down cutting and embeddedness are absent in drainages. Flood plains are functioning and lessen the impacts of floods on human safety, health, and welfare. The fuels composition within watersheds does not put the watersheds at risk for uncharacteristic disturbance. Water quality meets or surpasses State of Arizona or Environmental Protection Agency water quality standards for designated uses. Water quality meets critical needs of aquatic species. **Monitoring Plan: Natural and Constructed Waters:** Are there any water bodies not meeting Arizona water quality standards?	FSM 2510.2 (1),(3); 2522.1; 2525.03	Neither ST nor GD in 1988 plan. Translates into a DC for the revised plan.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Soil and Water	**Management Direction for Soil and Water in EMAs 1, 3,8,9,12,16.** Provide soil and water resource integration and coordination in land and resource management planning.	**Soils and Watersheds Management Approach:** On the Kaibab NF, the highest risk to watersheds is uncharacteristic wildfire. Projects that reduce this risk and restore the natural vegetative and fuels composition also restore watersheds. Projects that reduce this risk and restore the natural vegetative and fuels composition also restore watersheds. As a result, the Kaibab NF uses an integrated management approach to make progress toward the soil and watershed desired conditions. Objectives to address these needs are found in the "Major Vegetation Community Types," "Nonnative Invasive Species," and "Natural Waters" sections of this plan. With these and other activities, the Kaibab NF generally employs best management practices before, during, and after activities to reduce or eliminate adverse effects.	FSM 2510.6; 2511.02,.03 ; 2522.3	Revised plan is inherently integrated with other resource areas. This is neither a ST nor GD in the 1988 plan. Revised as a management approach.
Soil and Water	**GDs for Structural Habitat Improvement in EMAs 1, 3,8,9,12,16.** Install structures to promote recharge of wet meadows and riparian areas.	**Wetlands/Cienegas OBJ:** Restore native vegetation and natural water flow patterns on at least 6 acres of wetlands within 5 years of plan approval. **Natural Waters OBJ:** Protect and/or restore at least 10 individual springs within 5 years of plan approval.	FSM 2522.12	Prescriptive as written, restoration might not necessarily involve structures. Will vary by project/site.
Soil and Water	**Goals for Soil, Water, and Air Quality.** Maintain soil productivity and watershed condition. .... Maintain a high quality sustained water yield for Forest users and others. Identify and protect wetlands and floodplains.	**Natural Waters DC:** Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. **Watershed DC:** Water quality meets or exceeds State of Arizona or Environmental Protection Agency water quality standards for designated uses. Water quality meets critical needs of aquatic species. **Monitoring Plan:** Are there any water bodies not meeting Arizona water quality standards? **Constructed Waters DC:** Reservoirs maintain high water quality for parameters such as temperature, pH, and dissolved oxygen, and water levels are within the seasonal range of variable conditions. **Monitoring Plan:** What is the functional condition of the lakes and wetlands on the Kaibab NF? **Soil DC:** Soils can readily absorb, store, and transmit water vertically; accept, hold, and release nutrients; and resist erosion. **Monitoring Plan:** Are the effects of forest management resulting in changes to the productivity of soils (e.g. evidence of platy structures, pedestalling of vegetation or rock, rills)?	FSM 2510.2; 2522.1	Neither ST nor GD in 1988 plan. Revised as DCs

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Soil and Water	**Management Direction for Soils and Water in EMAs 1, 3,8,9,12,16.** Formulate and execute land treatment measures to (1) close, revegetate, and thereby obliterate, system roads not needed for resource actions and (2) establish ground-cover improvements in degraded, unsatisfactory watersheds to return them to satisfactory condition. Provide for the long-term maintenance of vegetative ground-cover improvements. Maintain soil and water inventory and information systems.	**OBJ Transportation:** Obliterate or naturalize 20 miles of nonsystem roads (unauthorized, decommissioned, etc.) within 10 years of plan approval. Grade surfaces and clean culverts and ditches on 100 miles of open National Forest System roads each year. **GD for Transportation:** Roads should be decommissioned when no longer needed.	FSM 2511; 2522.1, .2 ; 2509.22	Not a ST or GD in 1988 plan. New plan has specific objectives for road treatments and rehabilitation. Included in FSH 2509.22 (Soil and Water Conservation Handbook). Also, BMPs are found in FS-990a – National Best Management Practices for Water Quality Management on National Forest System Lands.
Special Uses	**GOAL for Lands:** Minimize the number of electronic sites and utility corridors consistent with appropriate public services that require the use of Forest lands.]	**GDs for Communication and Electronic Sites**, The number of communication and electronic sites should be the minimal that is consistent with appropriate public services that require the use of Forest lands. Environmental disturbance should be minimized by co-locating communication and electronic sites. **DC for Energy Transmission and Development:** Energy transmission and development on the Kaibab NF meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area. Energy corridors provide a reliable supply of energy essential to meet local, regional, and national economic demands. Joint use of rights-of-way is provided to concentrate uses to the extent possible. **SD for Energy Transmission**: Major utility corridor development is confined to the area identified and mapped in the "West-wide Energy Corridor Programmatic EIS (USDOE and BLM 2008)."	FSM 2726, FSM 2728, FSH 2709	Neither ST nor GD in 1988 plan. Revised as SD and GDs in the revised plan.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Special Uses	**GDs for Realty Operations in EMAs 2,10,13, 1,3,8,9,12,16.** Allow expansion of existing major utility corridors and clearing of new corridors (refer to Corridor Map for location of major utility corridors). Attempt to avoid the following areas: a.NZ: Areas with pristine, primitive or semi-primitive recreation opportunity spectrum classifications. b. Areas with high heritage resource values. c. Important wildlife habitat areas d.NZ: Visually sensitive areas. e. ORV closure areas. f. Lands classified as suitable timberland.	**DCs for Energy Transmission and Development:** Energy transmission and development on the Kaibab NF meets the legal mandates to facilitate the transmission and development of energy resources in a manner that minimizes adverse impacts and does not detract from meeting other desired conditions applicable to the area. Joint use of rights-of-way is provided to concentrate uses to the extent possible. Energy transmission lines are not visible (usually underground) across the landscape. **SD for Energy Transmission**: Major utility corridor development is confined to the area identified and mapped in the "West-wide Energy Corridor Programmatic EIS (USDOE and BLM 2008)." **GD for Energy Transmission and Development:** Environmental disturbance should be minimized by co-locating pipelines, power lines, fiber optic lines, and associated infrastructure. Existing energy corridors should be used to their capacity with compatible upgraded power lines, before evaluating new routes. When compatible with protection of heritage resources, the use of below-ground utilities should be optimized in order to avoid potential conflicts with wildlife, scenery, wildfire, and long-term vegetative management.	FSM 2726	Reframed in the revised plan as DC, SD and GDs.
Vegetation	**GDs for Air and Watershed Resource Operations and Improvements in EMAs 1,2,3,8,9,10,11,12,13,16,20:** Maintain not less than three age classes of woody riparian species with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings. Maintain not less than 90 percent of the potential shrub cover in riparian areas. Maintain not less than 90 percent of total linear streambank in stable condition.	**DC under Cottonwood-willow Riparian Forest:** The extent, diversity, and condition of riparian habitat contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. Vegetation is characterized by willow and other herbaceous understory species. Snag and gallery tree components comprise 55 percent mid-aged to mature cottonwood and willow trees, 25 percent younger trees and 20 percent in grass, forbs, shrubs, suckers, seedlings, and tree sprouts. **DCs for Natural Waters:** Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. **GDs** The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized.		1988 plan direction unrealistic given water rights issues and upstream diversions.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Vegetation	**Riparian Vegetation ST for EMAs 1, 3,8,9,12,16.** Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover.	**DCs Natural Waters:** Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Water levels, flow patterns, groundwater recharge rates, and geochemistry are similar to reference conditions. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion.	ESA	Reframed as a DC and ESA provides regulatory framework for Apache trout habitat.
Wildlife and Fish	**Goals for Fish and Wildlife:** Cooperate with the Arizona Game and Fish Department to achieve management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan, and in carrying out the cooperative agreement for the management of the Grand Canyon National Game Preserve. Support the Arizona Game and Fish Department in meeting its objectives for the state.	**Management Approach Wildlife:** The Kaibab NF continues to support the AGFD in various capacities directed toward managing wildlife, fish, and habitat. Areas for potential collaboration include (but are not limited to) achieving management goals and objectives specified in Arizona's State Wildlife Action Plan (SWAP), carrying out memoranda of understanding (MOUs) and the cooperative agreement for management of the Grand Canyon National Game Preserve, and management of recreation fisheries.		Descriptive information, not necessary in forest plan as a DC, ST, or GD.
Wildlife and Fish	**GDs for Wildlife and Fish Improvements in EMAs 2, 10, 13.** In other coniferous forest timberland: a. Encourage and promote oak and aspen. b. Encourage diversity of plant species in the overstory, understory, and ground cover. c. Turkey summer and winter home ranges. (1) Provide not less than four roost-tree groups per 640 acres in winter range. (2) Provide not less than two roost-tree groups per 640 acres in summer range. d. Provide one permanent water source per 640 acres.	**DCs for Wildlife:** Native wildlife species are distributed throughout their potential natural range. Desirable nonnative wildlife species are present and in balance with healthy, functioning ecosystems. Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. **Also see DCs for Ponderosa pine aspen and Gambel oak**		Specific habitat needs will be determined at project level. Turkeys not being carried forward as an MIS. Turkeys provided for through the course filter wildlife viability analyses by providing healthy vegetation conditions and structural diversity. No additional fine filter habitat needs were identified as plan components.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Wildlife and Fish	**STs for Wildlife Surveys, Project Planning in EMAs 1,3,8,9,12,16** : 1) FORAGE: Give priority to areas in need of additional forage for elk and mule deer when scheduling pinyon-juniper fuelwood special cutting for wildlife habitat non-structural improvement. Treatments are usually done in areas removed from disturbance to maximize habitat effectiveness.	**DCs for Pinyon-juniper:** Pinyon-juniper communities occur as a shifting mosaic interspersed with openings across the landscape. The configuration of vegetation and openings provides foraging and browsing opportunities for wildlife, and enough sighting distance and hiding cover for pronghorn to escape predators. There are opportunities for collecting forest products (firewood, pinyon nuts, posts, and poles, etc.) in a manner consistent with other desired conditions. **GDS:** Pinyon-juniper communities should maintain tree densities that maximize herbaceous plant growth and wildlife species diversity typical for their respective community subtype. Project design for vegetation management activities should prioritize treatment areas along known wildlife corridors, in the wildland-urban interface, and in historic openings. Restoration treatments in pinyon-juniper should be rotated over time and various successional stages to maximize wildlife habitat and diversity.		The forest works through an MOU with AGFD to provide site specific habitat needs for game species. Site specific fuelwood also handled through special use permit process.
Wildlife and Fish	**STs Wildlife Surveys, Project Planning in EMAs 1,3,8,9,12,16 :** 1) FORAGE: Design projects to achieve the following habitat standards: Provide forage cover ratios of 40:60 to 60:40. in areas where TES species habitat requirements do not conflict. In areas of conflict, new winter grazing use by livestock will be allowed when such use does not adversely affect wildlife objectives. Allocate forage to (a) maximize habitat capability for threatened and endangered species and (b) provide habitat capability for indicator and harvest species in the range specified in the State Comprehensive Wildlife Plan.	**DCs for wildlife:** Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. **GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **DCs for Livestock:** Livestock use is consistent with other desired condition. **GDs for Livestock Grazing:** Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.).	ESA	Allotment management Plans and Annual Operating Instructions would address forage and utilization (through NEPA process) on site specific basis.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Wildlife and Fish	**STs for Wildlife Surveys, Project Planning in EMAs: 1, 3,8,9,12,16** 2) COVER: Provide for at least 40 percent cover where TES species habitat requirements do not conflict. Emphasize cover in travelways, bedding areas, reproductive areas, and areas adjacent to water sources and openings. Cover areas will be at least 10 chains in width. Provide for hiding and thermal cover in fawning and calving areas. Restrict logging activities from May 15 to July 1 for elk and from June 15 to August 10 for mule deer. Provide for not less than 10 percent thermal cover in assessment areas. Emphasize thermal cover management in travelways, reproductive areas, and bedding areas. Provide for not less than 10 percent hiding cover in assessment areas. Emphasize hiding cover adjacent to water sources and openings, along travelways, and in pine stringers. Hiding cover shall not be less than 10 chains in width.	**DCs for wildlife:** Habitat is available at the appropriate spatial, temporal, compositional, and structural levels such that it provides adequate opportunity for breeding, feeding, nesting, and carrying out other critical life cycle needs for a variety of vertebrate and invertebrate species. Species with specific habitat needs (e.g. snags, logs, large trees, interlocking canopy, and cavities) are provided for. Grasses, forbs, and shrubs provide forage, cover, fawning, and nesting sites. Interconnected forest and grassland habitats allow for movement of wide ranging species and promote natural predator-prey relationships, particularly for strongly interactive species (e.g., mountain lions). Habitat configuration and availability allow wildlife populations to adjust their movements (e.g., seasonal migration, foraging, etc.) in response to climate change and promote genetic flow between wildlife populations. **GDs for TES**: Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species.		Overly prescriptive at the forest plan level as written. Site specific analyses will further develop design criteria. The forest works through and MOU with AGFD to address project level concerns and design criteria for these wildlife species.
Wildlife and Fish	**GDs structural habitat improvement in EMAs: 1, 3, 8, 9, 12, And 16:** Prevent livestock access to 70 percent of the shoreline of the stock tanks that have stable water levels with the capacity to grow emergent aquatic vegetation. In addition, fence up to five acres and seed to low height cover species.	**DCs for Constructed Waters:** Reservoirs maintain high water quality for parameters such as temperature, pH, and dissolved oxygen, and water levels are within the seasonal range of variable conditions. **GDs Livestock Grazing:** Annual operating instructions for livestock grazing permittees should ensure livestock numbers are balanced with capacity and address any relevant resource concerns (e.g., forage production, weeds, fawning habitat, soils, etc.).		Allotment management Plans and Annual Operating Instructions would address forage and utilization, and relevant stock tank issues (through NEPA process) on site specific basis

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Wildlife and Fish	**GD Structural habitat improvement for EMAs 1, 3, 8, 9, 12, 16:** Provide for one permanent water source per square mile.	**GDs Constructed Waters:** If new waters are constructed, they should be located in areas that would reduce ungulate impact to sensitive vegetation or soils such as riparian, aspen, and wet meadow areas. Drinkers should be maintained to provide water during times of scarcity. **DCs:** Artificial waters do not concentrate ungulate use in aspen stands. **Management Approach:** Work with the Arizona Game and Fish Department, grazing permittees, and sporting groups to manage constructed waters. Improve understanding of whether and how drinkers, tanks, and other constructed water features influence wildlife distribution and movement.		Site specific analyses will further develop design criteria. The forest works through and MOU with AGFD to address project level concerns and design criteria.
Wildlife and Fish	**GDs Wildlife non-structural habitat improvement for EMAs 1, 3, 8, 9, 12, 16:** Quaking Aspen: c. Prohibit grazing of improvement areas for not less than one growing season immediately following treatment.	**GDs for Livestock Grazing:** Livestock use in aspen areas should be authorized at levels that are consistent with the desired conditions for aspen regeneration and establishment. **DCs for Aspen:** Aspen occurs in natural patterns of abundance and distribution at levels similar to or greater than those at time of plan approval. Aspen is successfully regenerating and recruiting into older and larger size classes. Size classes have a natural distribution, with the greatest number of stems in the smallest classes. **GDs for Aspen:** Fences should be regularly inspected and maintained while aspen recovers. Fences should be removed when no longer needed.		Site specific. Will address aspen concerns on a case by case basis. If stand is treated, aspen will be protected from any and all grazing. Aspen identified as a priority need for change during the revision process.
Wildlife and Fish	**STs for EMAs 2, 10, 13:** Formulate and portray, describe, or quantify management objectives and desired conditions for the landscape. In landscapes that involve habitat for threatened, endangered, or sensitive plant or animal species, formulate management objectives and desired conditions for each designated management territory. Formulate, design, and implement resource operations or improvements that contribute to the achievement or maintenance of these management objectives and desired conditions.	**GDs for TES:** Project activities and special uses occurring within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species. **Management Approach:** The Kaibab NF maintains strong partnerships between the State, other federal agencies, academia, and nongovernment organizations to provide for TES species. Emphasis is placed on the protection and replacement of key habitats that contain threatened, endangered, and/or sensitive species of plants and animals. The Kaibab NF works with the USFWS and other partners to develop conservation measures (e.g. public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species. For 10(j) species, such as the California condor, this applies inside and outside the designated experimental range.	ESA	Work with FWS to fulfill Section 7 (a1) of the Act. Revised LMP has specific objectives and DCs which projects will include in site specific NEPA.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Wildlife and Fish	**STs for EMA 19:** Survey and evaluate assessment areas to achieve following habitat standards**:** 1. Re-distribute Apache trout upstream in North Canyon Creek when appropriate. b. Monitor aquatic macroinvertebrates biannually. Maintain a minimum Biotic Condition Index of 80. c. Consider the establishment of other populations of this species at suitable introduction sites to promote and secure the genetic integrity and viability of this species.	**DCs for Wilderness:** A reproducing population of Apache trout is maintained in North Canyon Creek. **DCs for Natural Waters:** Riparian dependent plant and animal species are self-sustaining and occur in natural patterns of abundance and distribution. Within its capability, stream flow and water quality are adequate to maintain aquatic habitat and water sources for native and desired nonnative species. Native macroinvertebrates are appropriately abundant and diverse. **DCs for Watersheds:** Water quality meets or surpasses State of Arizona or Environmental Protection Agency water quality standards for designated uses. Water quality meets critical needs of aquatic species.	ESA	Current plan overly prescriptive and redundant with law. Conservation actions for the trout fall under ESA and the forest will work with partners to achieve 7(a1) conservation needs for that species. Aquatic macro inverts no longer a MIS. Water quality addressed through revised plan DCs.
Wildlife and Fish	**STs for EMA 19:** Survey and evaluate assessment areas to achieve following habitat standards: 2. Peregrine falcon habitat. a. Prohibit activities which disturb nesting birds between March 15 and August 15. Extend this period if the birds are strongly attached to the nest site after August 15.	**GDs for Wildlife Management:** Project activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of wildlife, particularly for raptors. Potentially disturbing project-related activities should be restricted within 300 yards of active raptor nest sites between April 1 and August 15. **Management Approach Wildlife:** The Kaibab NF references current literature and the best available science when making site specific decisions relevant to project planning. This is done in an interdisciplinary context with input from other resource specialists. For example; the wildlife guideline specifying disturbance buffers around raptor nests is intended as a minimum buffer. Some raptor species (e.g., osprey) are more adapted to disturbance and are likely to tolerate a buffer of just 300 yards during the breeding season while other, less tolerant species (e.g. peregrine falcons (*Falco peregrinus*)) may require buffers of up to a ½ mile. Wildlife biologists work with other IDT resource specialists to identify and define the appropriate site specific buffers (within the context of plan guidance) for other raptors on a case-by-case basis.		No longer endangered species, but still regionally sensitive. Revised as a GD. Will work with partners and the State to meet delisting goals. Site specific design criteria decided at the project level.

Resource	1988 Plan Content	New Plan Direction (and or retained/modified direction)	Other Law, Policy, Regulation	Rationale for Deleting or Modifying 1988 Plan Direction
Wildlife and Fish	**STs for EMA 19:** Survey and evaluate assessment areas to achieve following habitat standards**:** Riparian Vegetarian. a. Inventory all riparian areas; collect data regarding location, size, classification and condition of the riparian. b. Maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers seedlings, and saplings. c. Maintain not less than 90 percent of the potential shrub cover in riparian areas.	**DC under Cottonwood-willow Riparian Forest:** The extent, diversity, and condition of riparian habitat contribute to ecological sustainability. Dense shrubbery and high levels of vegetative diversity (structural and compositional) and permanent water provide food, cover, and water for wildlife, including terrestrial and aquatic invertebrates and vertebrates. Vegetation is characterized by willow and other herbaceous understory species. Snag and gallery tree components comprise 55 percent mid-aged to mature cottonwood and willow trees, 25 percent younger trees and 20 percent in grass, forbs, shrubs, suckers, seedlings, and tree sprouts. **DCs for Natural Waters:** Stream channel stability and aquatic habitats retain their inherent resilience to disturbances and climate fluctuations. Stream channel morphology reflects changes in the hydrological balance, runoff, and sediment supply appropriate to the landscape setting. Springs and ponds have the necessary soil, water, and vegetation attributes to be healthy and functioning. Springs, streams, and ponds have appropriate plant cover to protect banks and shorelines from excessive erosion. The location and status of springs and water resources are known, organized, and available. **OBJs:** Protect and/or restore at least 10 individual springs within 5 years of plan approval. **GDs for Activities in and around Natural Waters:** The impacts of management activities on springs, streams, and wetlands should be evaluated and minimized.		Redundant with previous direction for other EMAs. Current plan direction not entirely realistic given water rights issues and upstream diversions.

Appendix N. Comments Received from Governmental Entities During the 90-Day Public Comment Period

The following Federal, State, county, and tribal agencies submitted comments during the DEIS comment period.

- Arizona Department of Environmental Quality
- Arizona Department of Transportation
- Arizona Game and Fish Department
- The Hopi Tribe
- Kaibab Band of Paiute Indians
- Kane County, Utah
- U.S. Department of Interior, Office of Environmental Policy and Compliance
- U.S. Environmental Protection Agency

This appendix provides copies of these comment letters

From: Wendy S. LeStarge <LeStarge.Wendy@azdeq.gov>
Sent: Monday, July 16, 2012 1:05 PM
To: FS-comments-southwestern-kaibab
Cc: Linda C. Taunt
Subject: Forest Plan Revision

This message is sent on behalf of Linda Taunt, Deputy Division Director of the Arizona Department of Environmental Quality, Water Quality Division (ADEQ):

We received the Draft Environmental Impact Statement for the proposed Kaibab Land Management Plan. ADEQ supports the goals that the Forest Service proposes in its Land Management Plan. Some proposed activities, such as mechanical thinning of forests, may require water quality permits or approvals. ADEQ has no other comments related to water quality. We appreciate the opportunity to assist in the review.

Wendy LeStarge
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May 4, 2012

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800 S. 6th Street
Williams, AZ 86046

Dear Michael Williams,

Thank you for allowing us to comment on the Draft Plan and the Draft Environmental Impact Statement for the proposed Kaibab Land Management Plan (File Code: 1920, date received: April 24, 2012).

The following are ADOT Flagstaff District's comments inclusively:

Comments regarding SR 67, SR 64, I-40, HWY 180, & HWY 89A Right of Way:

- Sediment (mud), vegetation or debris causing track-out from vehicles onto SR 67, SR 64, I-40, HWY 180, and/or HWY 89A must be mitigated using Best Management Practices (BMPs) (track-out pads, washing, etc).
- Proper signage and message boards must be installed in appropriate places to inform the traveling public of potential impact activities (construction, smoke, commercial trucks entering and exiting, etc.).

General comments:

- On drainages that are hydraulically connected to the storm water conveyances within ADOT Right of Way, pleases actively limit the amount of obliteration of existing ground cover vegetation to limit erosion.
- If erosion potential is increased due to the project that may impact ADOT Right of Way storm water conveyance, please, install BMPs to control sediment in stormwater runoff (straw wattles, hydroseeding, check dams, etc.)

ADOT's Flagstaff District is in support of the proposed project as it provides for a healthier forest, greater vegetation diversity, greater wildlife habitat, and decreased risk of high intensity crown fires. The Flagstaff District is in agreement with alternative B; however, we believe the old growth should be saved as much as possible. Additionally, we would like you (USFS) to consider future expansion of our Right of Way for the above mentioned roadways in that your proposed tasks of, protect and regenerate

aspen, protect natural waters, and restore grasslands, will not adversely affect the acquiring of more Right of Way in the future.

Other divisions of ADOT views or input are not included in this letter. You are welcome to solicit them separately. In any result, please include the following to your distribution list for future public notices, and, if other comments from ADOT are so desired, please contact:

Todd Williams, Director – Office of Environmental Services
1611 West Jackson St., Mail drop EM04
Phoenix, AZ 85007
Office phone: (602)-712-8272
Email: twilliams2@azdot.gov

The following are the contacts for emergency traffic response, guard rail, signage, and fencing maintenance, stormwater impacts, and any other resultant impacts from the project to ADOT's Right of Way:

Steven Mackelprang, ADOT Maintenance Supervisor
1298 N. HWY 89A/P.O. Box 500
Fredonia, AZ 86002
Office phone: (928)-643-7380
Office fax: (928)-643-7458
Email: smackelprang@azdot.gov

Please contact Steven for any resultant impacts or any unforeseen maintenance which affects SR 67, and/or HWY 89A near Jacobs Lake.

Dennis Johnson, ADOT Maintenance Supervisor
I-40B MP 165.5
Williams, AZ 86046
Office phone: (928)-635-4301
Email: DJohnson@azdot.gov

Please contact Dennis for any resultant impacts or any unforeseen maintenance which affects I-40, and/or SR 67 near Jacobs Lake.

Darwin Brewer, ADOT Maintenance Supervisor
1801 S. Milton Rd, F550
Flagstaff, AZ 86001
Office phone: (928)-527-0817
Cell phone: (928)-699-1604
Email: DBrewer@azdot.gov

Please contact Darwin for any resultant impacts or any unforeseen maintenance which affects HWY 180.

The following is the contact for traffic impacts from the project:

Kent Link, PE
1801 S. Milton Rd
Flagstaff, AZ 86001

Office phone: (928)-779-7570
Office fax: (928)-779-5905
Email: wlink@azdot.gov

Please contact Kent for any proposed road closures or new road to SR 67, SR 64, I-40, HWY 180, and/or HWY 89A that may increase or decrease traffic impacts or any unforeseen traffic maintenance.

The following is the contact for vegetative management for snags/tree removal invasive/noxious weeds or tree/brush removal for the final selected alternative within ADOT right of way:

Robert Guevara, Natural Resources Supervisor
200 W. McNeil
Show Low, AZ 85901
Office phone: (928)-526-2582
Email: RGuevara@azdot.gov

Please contact Robert for any proposed road closures or impacts to SR 67, SR 64, I-40, HWY 180, and/or HWY 89A that may increase or decrease vegetative management practices.

The following is the contact for Right of Way easements.

Wayne Smith
1801 S. Milton Rd.
Flagstaff, AZ 86001
Office phone: (928)-779-7535
Email: WSmith@azdot.gov

Wishing us success, sincerely,

Kurtis Harris, PE
Environmental Coordinator

for:

John Harper, PE
District Engineer

THE STATE OF ARIZONA
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KURT R. DAVIS, PHOENIX
DIRECTOR
LARRY D. VOYLES
DEPUTY DIRECTORS
GARY R. HOVATTER
BOB BROSCHEID

17 July 2012

Ariel Leonard, Forest Planner
Kaibab National Forest
800 S. 6th Street
Williams, AZ 86046

RE: Draft Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan and the Kaibab Forest Draft Land and Resource Management Plan

Dear Ms. Leonard,

The Arizona Game and Fish Department (Department) has reviewed both the Draft Environmental Impact Statement (DEIS) for the Kaibab National Forest Land and Resource Management Plan, and the Kaibab Forest Draft Land and Resource Management Plan (LMP), dated April 2012. The Department recognizes the vital role that lands administered by the Kaibab National Forest (KNF) currently play in providing wildlife habitat as well as opportunities for wildlife-related recreation in northern Arizona. As Arizona's human population continues to grow throughout the life of the revised LMP it is anticipated that wildlife and the public will become increasingly dependent on lands administered by the KNF. It is therefore essential that the LMP not only address current wildlife habitat needs and recreation needs, but also provide for the maintenance of high quality habitat and wildlife connectivity both within and across KNF lands that will be essential for sustaining healthy populations of wildlife within a more fragmented future Arizona landscape.

We would like to take this opportunity to thank the KNF for engaging the Department early and often during this planning process. The KNF's emphasis on collaboration and transparency will serve as an excellent example for other AZ Forests currently undergoing LMP revision. We commend the KNF for using rigorous science throughout the LMP process (especially throughout the monitoring sections). Lastly, we would like to thank the KNF for considering and incorporating the State Wildlife Action Plan's Species of Greatest Conservation Need into planning efforts.

The Department offers the comments and suggestions below, most of which have been previously introduced and discussed with Forest staff through the course of several collaborative meetings, emails, and phone calls.

Front Matter
We understand from discussions with Forest staff that the LMP will include a user guide of some kind to assist practitioners in navigating the Plan. The Department sees tremendous value in this addition and supports its inclusion. We specifically see this as a way to direct a practitioner to

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reference Endangered Species Recovery Plans and other appropriate documents while planning a project in compliance with the LMP.

Pinyon-Juniper Communities – Desired Conditions (DC's) (pg 11)

- We would like to see a DC highlighting a desired understory plant cover that also supports wildlife. As written, the DC support other ecological processes, such as nutrient cycling, etc. but do not explicitly call for vegetative conditions that benefit wildlife. Please consider this addition.

Pinyon-Juniper Grasslands –Desired Conditions (pg 12)

- "… Scattered shrubs and a dense herbaceous understory including native grasses, forbs and annuals are present to maintain soil productivity, resist soil erosion, support frequent low intensity surface fires, *and provide habitat for wildlife."*

Guidelines for Management Activities in Pinyon-juniper communities (pg 13-14)

- *"Where they historically occurred, patches of grassland are maintained by removing encroaching juniper".*
- *"Vegetation treatments and livestock utilization levels should favor the development of understory diversity in areas where it has the potential to establish and grow".*
- We would like to see guidelines for minimizing the spread of cheatgrass similar to those on Page 31 for sagebrush community.

Pinyon-Juniper Communities – Management Approach (pg 14)

- We understand the difficulty in setting restoration objectives for pinyon-juniper communities, given the KNF's limited capacity and the general paucity of scientific information available to guide pinyon-juniper restoration. However, there are management approaches that would help to achieve or maintain desired conditions, such as:
    - Designing and implementing livestock grazing strategies that enhance understory production and diversity
    - Emphasizing cheatgrass prevention and treatment, and foregoing fire if infestation levels are high. The guidelines for sagebrush communities address these issues, but cheatgrass is also problematic in pinyon-juniper systems. Management strategies should refer to the "*Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds – Coconino, Kaibab, and Prescott National Forests*" and integrate best management practices for both livestock and fire management programs
    - Prioritizing thinning projects in areas where juniper has encroached into historic grassland patches

Ponderosa Pine Forests –DCs (pg 14-18)

- We appreciate the emphasis on creating heterogeneous, uneven-aged forest structure at all spatial scales. We believe this goal will help restore more resilient forest structure and enhance wildlife habitat.
- Please consider providing a range of acres for the size of forest openings. Please refer to the AGFD-ERI-USFWS DRAFT document "*Desired Ponderosa Pine Forest Conditions for Wildlife in the Southwest*" (previously provided to KNF staff).
- Large tree groups have value for canopy dependent wildlife. While we agree with the Plan's finding that average tree group size should range from 0.1 to 1 acre in size, we recommend

that you also include language that larger groups are possible particularly on northerly aspects or on highly productive sites. We believe this is consistent with the historic range of variability.

Management Approach for Ponderosa Pine

General- It is our understanding that the Forest would like to allow for limited even-aged regeneration cutting, primarily to address heavy mistletoe infestations. The Department generally does not support even-aged management of forest ecosystems where data suggest that condition to be generally outside of the historic range of forest structure. The literature, as well as field observations, indicates that mistletoe treatments are usually ineffective. Timber treatments that can be drastic enough to reduce mistletoe are usually not practiced, and even if successful, mistletoe is only temporarily reduced. Conklin and Fairweather (2010) suggest that multiple sanitation-type research treatments in the Southwest are also ineffective.

In summary, the Department can support mechanical thinning treatments that allow natural disturbance processes (e.g., fire, endemic pests and pathogens) to occur at a range of endemic levels. We question the efficacy of regeneration cutting, and reserve some concern that the costs of creating even-aged conditions outweigh the benefits for wildlife.

Frequent Fire Mixed Conifer Forests - DC's (pg 19-21)

General- Mixed conifer is a rare wildlife habitat type in Arizona, comprising only 8% of the KNF. The increased diversity of conifer species within this type generally increases biological diversity especially in guilds like songbirds. To this end, it is important to recognize the unique importance of this vegetation type as separate from that of pure ponderosa pine. In addition, there is a lack of spatial data to indicate where dry mixed conifer occurs on the landscape. Therefore, the similarity of DCs between PIPO and dry mixed conifer could lead to type conversion of mixed conifer over time. As written, it is difficult to understand how implementation of treatment would differ in these two vegetation types. In fact the monitoring section addresses PIPO and mixed conifer together (see monitoring section on recommendations for changes).

- The Department would support smaller openings and larger tree groups within mixed conifer in order to accommodate the habitat requirements of species that depend upon denser conditions.
- Although mixed conifer is an open forest type, we would like to see emphasis on the fact that mixed conifer can be denser than ponderosa at all scales. For example, at the mid-scale it would be helpful to include "The more biologically productive sites contain more trees per group and more groups per area *than ponderosa pine."*
- Please include a DC that ensures that all tree species are being retained. These species include white pine, some white fir, Douglas fir, and spruce species, especially where there is presettlement evidence of co-dominance of these species.

Objectives for Frequent Fire Mixed Conifer (pg 21)

- "Mechanically thin 1,200-2,100 acres annually, *using an experimental, adaptive management approach"* or *"experimentally thin 1200-1400 acres".* Although this is mentioned subsequently in the Management Approach sections, we recommend that it be emphasized here so that it is clear to the reader.

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Aspen (pg 26-27)

- Please change *elk browsing* to *wild ungulate browsing and livestock grazing* (page 3).
- While the Department recognizes that elk and deer browsing impact aspen regeneration, elk are one covariate among many that contribute to the problem of aspen decline. The Department requests that the Forest recognize this by including a discussion about interest in engaging in a large-scale, multi-agency approach which may include research on the factors that contribute to aspen decline. We discussed this type of research at our last coordination meeting and we recommend that initial interest in collaboration be reflected at the Plan level.
- We suggest including a more extensive list of aspen treatment options which includes conifer removal, fencing, fire, coppice treatments, jackstrawing, and ripping.

Guidelines for Vegetation Management in All Forested Communities (pg 27-28)

General- In the guidelines for vegetation in all forested communities, we suggest expanding your discussion on providing conditions within the historic range of variability. Not only should vegetative characteristics fall within the desired range, but there should be full representation of conditions along the desired spectrum. This ensures that management is not always aiming for a minimum or an average, and that proportionate representation of various habitat conditions exists for the diverse wildlife on the KNF. We suggest including a desired condition or a guideline that ensures diverse vegetative conditions are represented from the low to the high end of the historical range of variability, cumulatively providing heterogeneity at mid- to landscape scales.

Old tree retention:

- The LMP proposes to maintain the flexibility to cut presettlement trees (primarily on the North Kaibab) within stands that 1.) "are not in a historic condition", and 2.) that may lack the "structural characteristics that the plan defines". Forest Staff describes these sites as large stands of presettlement trees where the tree density is unnaturally high, likely due to the disruption of the natural fire regime. Staff expressed concern that these areas, although unique, are at risk of wholesale loss in the event of crown fire. We question the need for removal of presettlement trees in this situation as large stands of old growth trees may be important local sources of biodiversity when compared to the larger landscape that is generally deficient of presettlement trees. Perhaps strategically placed treatments could offer protection to these unique and valuable features on the landscape. We would like further justification that this management is ecologically necessary, and suggest continuing the discussion through some field site visits. We would be happy to schedule some field days with Forest Staff in the near future.
- The Department appreciates the Forest's discussion of the ecological attributes of old trees, however, it is our opinion that the statement "Project design and treatment prescriptions *should generally retain*….." is too flexible to be certain that presettlement trees are retained on the landscape. The Department does not support cutting presettlement trees unless there is a risk to human safety or for specific cases where ecological benefits can be demonstrated (e.g., cutting a presettlement tree would be necessary to relocate a Forest system road out of a riparian drainage).
- We recommend defining old growth trees in a manner consistent with the 4 Forest Restoration Initiative:

- Old trees will be determined by the following characteristics described by Thomson (1940) as age class 3 (intermediate-mature) and age class 4 (mature-overmature) (currently the draft Plan only recognizes class 4):
  - Age – Approximately 150 years and older.
  - D.b.h. – Site dependent.
  - Bark – ranging from reddish brown, shading to black in the top with moderately large plates between the fissures to reddish brown to yellow, with very wide, long and smooth plates.
  - Tops – ranging from pyramidal or rounded (occasionally pointed) to flat (making no further height growth).
  - Branching – ranging from upturned in upper third of the crown, horizontal in the middle third and drooping in the lower third of the crown to mostly large, drooping, gnarled or crooked. Branch whorls range from incomplete and indistinct except at the top to completely indistinct and incomplete.

- Lastly, should the flexibility to cut pre-settlement trees remain within the Plan, the Department requests that at a minimum the Forest clearly outline when and why management would deviate from the "should generally" retain recommendation.

Regeneration openings:

- The Department has concerns over openings created for regeneration within the framework of restoration.
- While the Forest is not defining an objective for how many acres/year of regeneration is the goal, it is our belief that creating regeneration openings may be the equivalent to creating even aged tree groups over time, which is counter to what is known about historic patterns of regeneration in southwestern forests (see White 1985).

Oak:

- Please add *retain all large oaks* as a guideline for vegetation management across all forested communities.

Reseeding for revegetation:

- "Genetically local sources" of seed can be difficult to procure. Consider the use of native seed sources from a *regionally adapted area* if local sources are not available.

Guidelines for following large-scale disturbances (pg 28)

- *Where extensive tree mortality results from fires……salvage of dead trees should be considered."* Please replace *"should be" with "may be"* with respect to salvage logging.
- Although there is a paucity of information relating to salvage logging in the southwest, the Department generally does not support salvage unless it can be proven that it will not inhibit natural recovery/regeneration, increase non-native invasive species, and/or increase soil compaction or erosion.

- The Department could support limited salvage logging where safety is a concern, when co-located with existing disturbance such as roads, and/or when there is strong evidence to suggest ecological benefit outweighs ecological cost.
- The Department generally does not support replanting of trees in mixed conifer areas which may have had a fire regime that included some naturally occurring stand replacing fire.
- The Department would like to see language about restocking that indicates that the resulting structure would mimic historic conditions. I.e., plantings should be arranged to achieve a heterogeneous structure, or later be thinned to a more natural forest structure.
- If post fire seeding is done, please incorporate seeds into the seed bed in some way. Several studies have shown that broadcast seeding is ineffective in nearly all cases.

Guidelines for Vegetation Management in Sagebrush Communities (pg 29-30)

- Please consider mechanical treatment and seeding as an option for sagebrush restoration. This section is very general, so that it is not clear whether mechanical treatment would be allowed or encouraged. Perhaps a management approach section could be added here to add specificity.

Grasslands (pg 31-35)

- As in the pinyon-juniper management guidelines, please include direction for minimizing spread and new infestations of cheatgrass. Page 31 addresses cheatgrass guidelines for sagebrush communities.

Desired Conditions for Desert Communities (pg 35)

- The statement "Native ungulates free from disease and domestic livestock are absent" seems out of place within a vegetation community discussion. Reference to disease may better fit within the Wildlife DCs, where it can apply to desert bighorn, elk, deer, and other ungulate species.

Cottonwood willow riparian (pg 38)

- "*When non-native vegetation is present…..*" should not be included as a DC. It is understood that the Forest is likely referring to tamarisk here, but this issue could be more adequately discussed and clarified within the introduction or management approach. As is, it reads as if having "non native" vegetation is a goal.

Constructed waters Introduction (pg 43)

- *"Various water impoundments have been…….reservoirs, lakes, and wildlife drinkers".*

Wildlife DC's (Pg 44)

Pinyon Juniper:

The Department would like to work with the Forest to include some language that allows for management of pinyon juniper communities toward a condition that may be considered outside of historic conditions (typically more open), and therefore outside of the DC's as written. In limited areas on the Forest, both the Forest and our Department have found value in treating toward more open conditions, for example in the Westside Mule Deer Habitat Improvement Project. Some of the best mule deer habitat we have on the Forest is in isolated patches that were once chained, cabled, or

bull dozer-pushed several decades ago. While in most cases these historic treatments can be considered type conversion, they have allowed the native understory to infill what would otherwise be dense pinyon and juniper, therefore creating quality wildlife habitat.

- The Department would like to recommend there be a wildlife DC (or management approach) that reflects the ability to move outside of historic conditions when the benefit adds heterogeneity to systems and improves wildlife habitat. This type of treatment would be particularly important for places like the Grand Canyon Game Preserve, where management for game species is a priority.

Species-specific recommendations under DC's:

The Department recommends that the Forest refrain from calling out single species, such as the goshawk, within the general context of the wildlife DC's and Guidelines, unless they are a Threatened or Endangered species with a recovery plan.

- The Department recommends that the Forest include something that reads *"forest habitat configuration and structure allows for species that require open habitats (pronghorn) and more closed canopy habitats (MSO, NOGO)."*
- With respect to species with a recovery plan, such as MSO, we recommend incorporating specific plan components both throughout the vegetation DC's as well as within the wildlife DC's. The Department recommends this be added so that it is clear to resource specialists on how and when to implement recovery plans.
- Currently, there are some species-specific wildlife DC's in the Plan. While particular species or guilds may deserve specific mention, it is not clear why the species mentioned were selected versus other species that may fall on the Forest Service Sensitive Species List or the AGFD Species of Greatest Conservation Need List. We recommend clarification as to why these particular species are given preference.
- *"Hunting and other wildlife based recreation.....~~but do not compromise species populations or habitat~~ contributes positively to wildlife populations in terms of their management and habitat.*

Guidelines for Wildlife Management (pg 44-45)

- Please include the Department's State Wildlife Action Plan Species of Greatest Conservation Need in bullet 2.
- Please explain more fully why raptors are called out in bullet 2 (see above questions regarding species-specific wildlife DC's).
- The Department recommends including a DC or guideline for MIS species specifically in the Plan.
- Please include a guideline which recommends moving fences back from roadways to facilitate pronghorn crossing.

Management Approach (pg 45)

- We would like to thank the Forest for its mention of working together with the Department to achieve management goals defined in our State Wildlife Action Plan, and for your attention to habitat connectivity issues throughout the draft Plan.

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Non-native Invasives Introduction (pg 47)
General – This section is vague in its reference to non-natives and opportunities for restoration, specifically native fish restoration. The Department would like to work with the Forest to strengthen this section to allow and facilitate native fish restoration on the Forest.

- Illegal introduction of non-native species is one of the greatest threats to both native fish populations and to sport fisheries in the Southwest. The Department would like to continue its cooperative effort with the Kaibab to educate the public regarding the impacts of illegal transport of aquatic wildlife.
- Please add that *non native aquatics directly and adversely affect other native species, through predation, habitat partitioning, etc.* and not just ecosystem function.

DC for Nonnative Invasives

- In the first bullet, please add *"or impact native wildlife"* and "*eliminated when practicable"*.
- Add language that at the implementation level could facilitate native fish restoration.

Recreation and Scenery (pg 54)

- Lakes on the Kaibab National Forest are some of the most utilized and important sportfish opportunities in the areas surrounding Flagstaff. The Department would like to thank the Kaibab for its support in managing these areas and would like to see that support reflected as an approach or guideline for management into the future, as the challenges of illegal introductions of new species and lack of water during drought years are expected to persist.

Grazing DC's (pg 60)

- Please add a DC that indicates that grazing duration and intensity occurs "at levels that do not conflict with, damage, or otherwise harm valued resources including wildlife.
- Does allotment fencing include pasture fences? The Department recommends that pasture fencing as well as allotment boundary fencing facilitates animal movement. Please clarify.

Guidelines for Grazing (pg 61)

- The Department recommends that *"concentrated use of montane meadows"* be avoided. The Department could support light use if adequate rotation occurred, and grazing options elsewhere were limited.
- The Department would like to propose there be a process whereby other resource specialists (including external partners) can be involved in Annual Operating Instruction decisions. Because wildlife resources can be affected by the results from AOI decisions, we would like to request engagement in this process. This would be particularly helpful for decisions such as range readiness after a disturbance event.
- The Department recommends there be flexibility relating to reduced utilization percentages. We recommend flexibility to reduce below 30/40 percent utilization if there are other equally valued resources, such as mule deer on the Kane allotment which are part of the Grand Canyon Game Preserve. The Department supports utilization decisions that are made on an allotment-by-allotment ecological basis, rather than a forest wide decision of 30/40 percent.

- Degradation of reservoir banks by cattle impacts important sport fisheries on the Kaibab. An example of this degradation can be seen at White Horse Lake. We recommend including reference to these water bodies specifically in the guidelines for grazing. The Department would like to work with the Kaibab at the implementation level to reduce the impacts of cattle on sport fisheries on the forest.

Forestry and Forestry Products (pg 62-64; see also Timber Suitability pg 97-98)
The Department fully supports reducing the extent of KNF lands identified as suitable for timber production; many of those lands are more appropriately managed as grasslands or savannahs for wildlife under a restoration framework. At this time we do not clearly understand how the KNF calculated its Allowable Sale Quantity (ASQ) and Long Term Sustained Yield (LTSY) for the LMP, and we request an opportunity to meet with Forest Staff to learn more specifics about this process.

Wildland Fire Management (pg 64)
North Canyon (located on the North Kaibab) is home to an important population of endangered Apache trout. This population provides a refugium for the Ord strain of this listed fish. Fire is the biggest threat to this population. The Department encourages the Kiabab to recognize this location as sensitive and to manage fire accordingly.

Transportation and Forest Access (pg 66-67)

- Please include a guideline which recommends moving fences back from roadways to facilitate pronghorn crossing. We recommended this addition within the wildlife DC's, but it may be more appropriate to include it here.
- We appreciate the emphasis on maintaining and improving public access on KNF lands. We encourage the forest to work with adjacent landowners and permittees to increase access, for example by acquiring lands and ROWs, and including access requirements in grazing allotment permits.

Energy Transmission and Development (pg 71-71)

DC's for Energy Transmission and Development

- Add standards from the Avian Power Line Interaction Committee (APLIC) standards for any above ground transmission lines
- Add a DC that makes reference to energy development that is in balance with other resources being managed such as wildlife. *"Energy development exhibits proper site placement and safeguards therefore the benefits of development outweigh the potential for negative effects to wildlife populations."* See Coconino County's Energy Element for further recommendations at www.coconino.az.gov

Guidelines for Energy Transmission and Development

- Please make direct reference to working with USFWS and AGFD for reducing impacts to wildlife from energy development. The Department requests that the forest indicate to developers at the Plan level that it is essential to work with wildlife agencies early in the process. Developers can be referred to www.azgfd.gov and www.fws.gov

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Wilderness (75) and recommend wilderness (pg 84)

The Department recognizes the long-term value to wildlife and the public that special designations can provide. Impacts to wildlife from the continued and irreversible loss of habitat resulting from development and transportation infrastructure is a major concern to the Department, and is the leading challenge facing the Department in maintaining Arizona's wildlife heritage and wildlife recreational opportunities into the future. Designated wilderness areas can and do play an important role in assuring the long-term protection of wildlife habitat from the threat of development.

Also of concern, however, is the continued ability of the Department to adequately manage Arizona's wildlife. As habitat becomes more restricted and fragmented the Department will need to provide a more proactive approach to wildlife management in an effort to maintain and improve declining populations of game and nongame species. A hands-off approach to maintenance of biological diversity is no longer a feasible option, especially in Arizona, where human related impacts have resulted in generally small population sizes. Although wilderness designation offers much value, the Department has experienced restrictions resulting from such special land designation, including project delays and increased costs, and , and is concerned that if not properly implemented additional wilderness designations could further inhibit the Department's ability to perform necessary management activities.

The Department therefore requests that the Forest coordinate closely with the Department concerning wilderness designations to ensure that full consideration is given to the potential impacts on the ability of the Department to continue to manage fish and wildlife resources and thus maintain and enhance Arizona's wildlife heritage and wildlife recreational opportunities into the future. Specific management actions which may be necessary, and may necessitate the use of motorized equipment include but are not restricted to: periodic fish surveys and non-native fish removal utilizing nets or battery and gas powered electrofishing equipment, construction or maintenance of fish barriers chemical stream renovations, fish stocking, low-level aerial wildlife survey, research, and law enforcement flights, wildlife capture, construction of temporary release pens, construction and maintenance of wildlife water, providing salt and mineral supplements, depredation and wildlife mortality investigations, conducting habitat restoration activities such as application of prescribe fire, and law enforcement and public safety activities. Absent these provisions the Department would not be able to support any wilderness designation.

With regard to management of existing wilderness areas, the Department believes that active forest restoration activities that reduce the risk of unnaturally severe fire are urgently needed. We encourage the Plan to consider taking a strategic, experimental approach that allows for mechanical treatment of the heaviest fuel loads to achieve restoration objectives. Language to this effect would be similar to the experimental approach described for treatment of the mixed conifer vegetation types.

Double A Wild Burro Area (pg 80)
The Department would like to see an Objective to reduce the population below the permitted number by x time. This is consistent with the bison DC (93), which recommends maintaining the herd size within a specified range.

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Grand Canyon Game Preserve
Strike the word "*breeding*" from the DC. This area is important for game animals in all seasons, and especially for mule deer in the winter.

Kaibab Plateau Parkway
Add "*and to facilitate animal movement*" to the third DC.

WUI
We request clarifying language to distinguish between the CWPP (which covers all of the Williams District (326,000 acres) and the WUI areas that buffer specific features. As it reads, there could be misinterpretation that the Desired Condition is to manage the entire CWPP toward the lower end of basal area. In addition, it would be helpful to estimate the acreage of WUI designation and to reiterate the size of buffers and feature types buffered by WUI treatments.

Garland Prairie (pg 89)
Garland Prairie supports some of the highest fawn:doe ratios for pronghorn anywhere in the state of Arizona. We recommend the KNF include mention of this value in the Management Area discussion, and specifically encourage a pronghorn-friendly boundary fence in the Objectives.

Buffalo (pg 93)
The DC should be revised for accuracy. The MOU for bison management does not specify a maximum herd size. The Department and KNF have mutually agreed that the herd be managed between 90 and 100 animals.

Similarly, the Guidelines state that bison "*should be confined*" to the area identified in MOU. The MOU does not define an area to which the bison must be confined. There is reference to a fence on the north side, but the herd is otherwise to be managed as free ranging within the House Rock area. The MOU does not commit either party to confining the animals in any way.

Chapter 5: Monitoring
The Department applauds the KNF for the high-quality monitoring plan they have drafted in the LMP. We believe this plan should serve as a regional if not national model for forest plan monitoring, and we commend KNF staff for their incorporation of the best available science and their high level of collaboration with scientists and managers in the development of this plan.

It is our understanding that KNF staff intend to continue collaborating with the Department and others to more fully develop an implementation strategy for this monitoring plan. In the interim, we offer the following suggestions:

- We would like to see greater emphasis on oak and specific monitoring objectives to address oak separately from general ponderosa pine forest.
- Consistent with our comments regarding the important distinction between dry mixed conifer and ponderosa pine forests, we recommend separating the two vegetation types in terms of monitoring questions, metrics, and methods to assess progress toward desired conditions in each type.
- Consistent with our recommendation to consider the full range of aspen treatment methods, we suggest including additional monitoring metrics and objectives that relate to other treatment methods.

Arizona Game and Fish Department
Kaibab National Forest Draft EIS and LMP- July 2012

- The Matrix Table No. 7 asks the question 'how many acres of the forest is in an uneven aged open state at the midscale (above 100 acres)?' While presettlement evidence suggests that this would be the dominant condition at the midscale, we know that patches of forest in an uneven aged "closed" state existed at the fine scale and perhaps in some small proportion at the midscale because wildlife that depend on those conditions are still present today. We suggest adding a monitoring question that addresses and tracks this issue.
- Matrix Table No. 14 asks the question 'does habitat configuration provide functional connectivity for pronghorn?' This is a very important question and we support its inclusion as a measure of open habitat conditions, but recommend also considering a corollary for closed habitat conditions such as black bear or grey fox.
- As the Four Forests Restoration Initiative develops its monitoring plan for the Coconino – Kaibab Project Environmental Impact Statement, and given the high spatial overlap of the Kaibab Plan and the 4FRI Project, we encourage the KNF to crosswalk its plan with that of 4FRI. The goal here would be to identify synergies and efficiencies in both plans.

Thank you for the opportunity to provide comments on the Kaibab National Forest Draft Land and Resource Management Plan. We will continue to engage in this planning process and hope to work collaboratively with the Forest to implement projects in support of the approved Plan. Please contact Andi Rogers (928-214-1251; arogers@azgfd.gov) or Jessica Gist (928-214-1274; jgist@azgfd.gov) with any questions or to discuss the above items in greater detail.

Sincerely,

Ron Sieg, Region II Supervisor
3500 S. Lake Mary Rd
Flagstaff, AZ 86001
(928) 774-5045

cc (electronic):
Brenda Smith, US Fish & Wildlife Service, Arizona Ecological Services
Valerie Foster, US Forest Service, Kaibab National Forest
Andi Rogers, Arizona Game & Fish Department, Region II

LITERATURE CITED:

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THE HOPI TRIBE

LeRoy N. Shingoitewa
CHAIRMAN

Herman G. Honanie
VICE-CHAIRMAN

July 23, 2012

Michael R. Williams, Forest Supervisor
Attention: Ariel Leonard, Forest Planner
Kaibab National Forest
800 South Sixth Street
Williams, Arizona 86046-2899

Dear Supervisor Williams,

This letter is in response to your correspondence dated April 11, 2012, regarding an enclosed draft Proposed Land and Resource Management Plan (Proposed Plan) and Programmatic Draft Environmental Impact Statement for the Proposed Land and Resource Management Plan (DEIS). The Hopi Tribe claims cultural affiliation to the prehistoric cultural groups in Kaibab National Forest. The Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites and Traditional Cultural Properties, and we consider the archaeological sites of our ancestors to be "footprints" and Traditional Cultural Properties. Therefore we appreciate the Kaibab National Forest's continuing solicitation of our input and your efforts to address our concerns.

We further appreciate the Forest's consultations in the development of the Proposed Plan and DEIS. We have reviewed the enclosed Proposed Plan and DEIS, and understand they address four areas where there are priority needs in change for program direction. We understand the dire condition of the Forests in the Southwest, in part due to a century of Forest Service management, and we appreciate the four areas where there are priority needs in change for program direction, including springs and waters. However, we note that in spite of the Forest Service's Sacred Sites listening sessions, heritage resources and Traditional Cultural Properties are not identified in the Proposed Plan and DEIS as an area where there are priority needs in change for program direction.

We understand approximately 30% of the Forest has been surveyed for heritage resources and over 9,600 historic properties have been identified and documented. Therefore, we calculate approximately 70% of the 1.6 million acre Forest, or approximately 1.12 million acres, has not been surveyed for heritage resources. At the goal of surveying 100 acres per year, we calculate that it will take the Forest approximately 11,200 years to complete heritage resource survey of its lands. As the Sacred Sites report to the Secretary states, "To disrespect the value of Native American sacred sites would perpetrate the cycle of trauma." Therefore, we recommend improved heritage resources management be considered a priority need for change in program direction in the Proposed Plan and DEIS.

We appreciate and support the designation of Bill Williams Mountain and Red Butte as management areas. Regarding the Bill Williams Mountain management area, we appreciate and support the guideline that the ski area should be restricted to the existing established permit area, and the standard that artificial snowmaking will not be permitted.

Regarding the Red Butte management area, we appreciate and support, the Desired Condition: "The environment is essentially unmodified. Natural occurring scenery dominates the landscape," and the guideline: "Commercial use…should not be permitted." The recent decision to uphold a 26 year old approval of the Canyon Mine is inconsistent with this Desired Condition and guideline, and inconsistent with the Traditional Cultural Property designation.

We note that every recent Forest Proposed Plan and DEIS has had Alternative B, ecological restoration, as the preferred alternative. The consistency of the preferred alternative in each Forest's Proposed Plan and DEIS reflects a continuing national management direction that de-emphasizes regional and Native American interests. Therefore, the Forest Service continues to make decisions consistent with national management preferences, for example ski and mining industry proponents, and continues to minimize and attempt to mitigate the adverse effects of such decisions on Native American Sacred Sites and Native American people.

The DEIS states on page 8 that "Locatable minerals are subject to the General Mining Law of May 10, 1872, as amended, and are outside the authority of national forest planning." In our November 14, 2011 letter to Secretary Vilsak regarding some of the Sacred Sites threatened by Forest Service, we supported the Direction/Policy Recommendations in the report, specifically Competing Statutory Obligations. 1. Explore changes to the 1872 mining law…to permit greater agency discretion when Sacred Sites may be impacted, and 2. Use mineral withdrawal authorities to proactively protect areas that include Sacred Sites.

Another recommendation we have made is that the Department of Agriculture and Forest Service incorporate the United Nations Declaration on the Rights of Indigenous Peoples into its policies and procedures and commit to abide by its terms. Therefore, please cite the Declaration in the Decision Framework sections of the Proposed Plan and DEIS.

Each of the four alternatives states that it "would have no measurable direct effect on heritage resources." That is because the Proposed Plan and DEIS do not directly address heritage resources and Traditional Cultural Properties as a priority need in change for program direction. However, because we appreciate and support the designation of Bill Williams Mountain and Red Butte as management areas, and because we support an additional 44,126 acres of potential wilderness areas, we support Alternative C in the DEIS. This alternative provides the most potential to benefit Traditional Cultural Properties and Sacred Sites.

We further appreciate our ongoing consultations with Kaibab Nationa Forest. If you have any questions or need additional information, and please contact Terry Morgart at the Hopi Cultural Preservation Office. Thank you for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Arizona State Historic Preservation Office
Havasupai Tribe; Hualapai Tribe; Navajo Nation
Grand Canyon Trust; Sierra Club; Center for Biological Diversity

Kaibab Band of Paiute Indians

July 16, 2012

Mr. Michael Lyndon
Attn: Forest Plan Revision Team
800 S. 6th St.
Williams, Arizona 86046

Submitted via email to: mlyndon@fs.fed.us

Re: **Kaibab Draft Land & Resource Management Plan**
Draft Environmental Impact Statement

The Kaibab Band of Paiute Indians is responding as a stakeholder to your request for comments regarding the draft Environmental Impact Statement and draft Land & Resource Management Plan for the Kaibab National Forest. The comments, questions, and concerns in the letter before you represent a consolidation or summary of those received from various Tribal government departments and resource specialists after their review of these draft documents. We hope that our comments will help in the preparation of revised and final documents.

Our Kaibab Band of Paiute Indians continues to have, and has had, an extensive, complex, and documented standing in the forest region of the proposed project. Not only have our ancestral people made this region our home since time immemorial according to our oral history, but we continue to actively use the area and its resources in our lives today as an integral part of our living culture.

As we have always indicated, we want to protect our lands, resources, people and culture (including our ancestors) in perpetuity; maintaining and promoting a respectful relationship with the United States Forest Service on the Kaibab National Forest are an effective way to achieve those goals.

Our specific comments, questions, and concerns are as follows:

Draft Land & Resource Management Plan

Pg. 53 We would like to see the objective for nonproject related cultural resource survey acreage increased to at least 500 acres per year to better identify their

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Phone (928) 643-7245
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locations in light of increased susceptibility of the forest to climate change issues that will likely increase extreme fire behavior

Draft Environmental Impact Statement

Pg. 58 Paragraph 1. There is no Southern Utah Paiute Tribe; this can be changed to several bands of Southern Paiutes, or more specifically, to the Kaibab Band of Paiute Indians.

Pg. 146 Paragraph 1. Please change "Kaibab-Paiute" to Kaibab Band of Paiute Indians.

Pg. 147 Although consideration has been given to Nonnative Invasive Plants, the same process needs to consider Nonnative Invasive Animals, such as the *Diorabda* beetle.

Pg. 223 Heritage Resources is missing any discussion of the management of sacred sites and ethnographic resources that may not be archaeological, a TCP, or a Traditional Use Area.

General Comment We encourage the highest level of protection for all natural water features plus the Kanab Creek area and its tributary canyon systems.

We look forward to a more comprehensive document once all comments have been evaluated and incorporated. As mentioned, we have a firm standing in the management of this region, and wish to continue to be apprised on all NEPA proceedings.

Sincerely,

Manuel Savala
Chairman
Kaibab Band of Paiute Indians

July 17, 2012

Ariel Leonard, Forest Planner
Kaibab National Forest
800 S. 6th Street
Williams, AZ 86046
Email: comments-southwestern-kaibab@fs.fed.us

Subject: Draft Land and Resource Management Plan for the Kaibab National Forest

KANE COUNTY'S COMMENTS
Re:
DRAFT Kaibab National Forest Management Plan - EIS

In accordance with 42 U.S.C. 4321 et seq., and as provided for in the National Environmental Policy Act of 1969 (NEPA), Kane County wishes to provide comments regarding the Draft Land and Resource Management Plan for the Kaibab National Forest (DEIS). After reviewing the DEIS, Kane County expresses appreciation to the Forest Service for their efforts in the preparation of the DEIS and for the opportunity to comment accordingly.

Kane County believes the DEIS adequately complies with the majority of the requirements of the NEPA process, and therefore would not like the for final approval and corresponding ROD be delayed. As the entire proposed planning area is adjacent to Kane County and that the county includes several forest dependent communities, the county requests that the foregoing comments receive serious consideration in creating the Final EIS and in the issuance of the Record of Decision (ROD). The Kane County Board of Commissioners further requests that the Kaibab National Forest Service contact and coordinate with us on the relevant forest plan issues discussed herein.

Kane County Supports Alternative B

First and foremost, Kane County would like to express its strong preference for Alternative B of the DEIS. Kane County supports Alternative B for the following reasons:

- Over the term of the plan, Kane County stands to gain significant financial benefits that will positively impact the residents of Kane County, from the direct and indirect effects of natural resources development, employment and local business sustainability.
- Increased taxes collected by the County will result due to the jobs and goods purchased locally that supported by the plans alternatives as displayed in table 55 of the DEIS.
- Creation of primary family supporting jobs, as well as secondary and indirect wage incomes in Kane County
- It's anticipated that several local small businesses, each contributing to the local economy will be established, operated and located in Kane and Coconino Counties.

- Healthcare for employees and dependents, which will lead to increased support for local medical and hospital revenues for vital health care infrastructure.
- Families of the forest products and associated stewardship services employees hired will move to Kane County, or have reason to maintain their residence in Kane County, and thereby be likely to contribute to local school enrollments, which been recently in decline.
- Forested ecosystems and habitat restoration processes through vegetation management of areas that are currently degraded due to the excessive presence of crown fires, disease and insects will be enhanced. Susceptible and overstocked woody biomass (trees of all sizes and densities) along with pinion juniper over time has become unnecessarily unsustainable due to benign neglect.

Kane County Opposes Alternatives A, C and D

Alternative A, the no action alternative, would fail to allow Kane County to realize the benefits outlined previously, and would go against the multiple-use and general purposes of the National Forest Management Act of 1976(NFMA), the Multiple-Use Sustained Act of 1960.

Alternative C is not a good alternative. Alternative C would preclude the recovery of additional forest resources. Those unrecovered forest resources actually become financial liabilities due to excessive costs to the US Treasury in these times of soaring federal deficits.

Alternative D, and likely Alternative C, would also result in a loss of the potential revenue from forest management activities as the forest strives to restore and maintain sustainable historic fire regimes. Alternatives A, D or C would result in a lost opportunity and likely a lost benefit nationally, for Utah, and for Kane County, because it would fail to realize the full potential of sustainable forested ecosystem and sustained yields from the forest. These three alternatives infringe on the overall socio-economic benefit to the residents of Kane County and the citizenry of the Arizona Strip.

Residents of Kane County

The majority of Kane County residents support proactive forest management and the maintenance historic fire adapted ecosystems on the North Kaibab Ranger District. The Kaibab Plateau has been a permanent and necessary part of Kane County's historic and cultural fabric. It is with great concern that the residents note that recent passive and irregular policies involving forest resource management yields little or no value in helping to sustain schools, transportation and multiple uses of the land.

Based on the foregoing, it is apparent that Alternative B is the superior and most beneficial option in the next 10 to 15 years of forest management and sustainability. Kane County asserts that the environmental impact of Alternative B is negligible compared to socio-economic benefits. Kane County is adamantly opposed to Alternative A, as it would infringe on the overall socio-economic benefit to the county.

Multiple-Use of Forested lands is Critical to Kane County's Economic Viability

Tax revenue is available to the County mainly through the ad valorem property tax. Secondarily is the County's share of sales tax receipts. The limited amount of private property in the county greatly restricts the tax revenue of the County. That limited tax base must be protected, and the continued vitality of that tax base is dependent upon continued multiple use of the federal lands. If multiple-use is restricted, business income will suffer and sales tax will be reduced. If timber harvest is restricted, financial pressure will be placed on the forest products company and their employees who will eventually result in them going out of business. When that happens, the tax base of the County suffers, and the business and employment incomes are reduced.

In such a slightly populated County, as Kane County is, all sources of economic support must be maintained at their highest possible level. In order to sustain the economic stability of the community, County and culture. The Kane County Board of Commissioners have dedicated themselves to a coordinated land use planning effort which can hold the federal management agencies to standards set by Congress regarding continuation of multiple uses of federal lands.
The Kane County General Plan, dated November 28, 2011, recognizes the need for responsible development of all sustainable natural and renewable resources to provide a stable and diverse economy in Kane County. Kane County supports multiple use and development of all federal natural resources, including its forest resources in and adjacent to Kane County.

Draft Plan and EIS Specific Commentary and Recommendations

- Separate objectives for "Acres Treated" are needed for the final plan and EIS.
- As modeled in the DEIS "ingrowth" over the planning horizon will exceed "harvest and removal actions"; accretion (growth on existing trees) minus mortality to reach desired historic fire adapted objectives will be found to be wanting and planned forest conditions will not be achieved.
- The draft plan indicates that it is proposed to thin 11,000 - 19,000 acres per year on the NKRD and considering the Forest Service's present "capacity" to do so is limited by appeals and budget, one wonders whether this can be accomplished on the current trajectory that the Forest Service finds itself.
- Can the NKRD obtain and program certain priority landscapes treated in order to meet planed objectives before 2025 to 2030 AD.
- The acreage figures in Table 53 on page 263 are in error and should be 40,684 acres for 9" DBH + on THE NKRD. This fix in the figures should show substantial increases in the Socio-Economic benefits and outputs.

- Mixed conifer will continue to have issues due to US Fish and Wildlife Service's preoccupation with critical habitat designations for nonexistent populations of Mexican Spotted Owls (MSO) on the NKRD, particularly after the Warm Fire blew out any practical chance of establishing viable populations of MSO on the NKRD Under the MSO recovery plan in the present or in the future.

- The draft plan and EIS has replaced VSS for Goshawk management guidelines and the new approach is to have differencing 3-5 acre sized age classes for forest structure and habitat diversity, the challenge will to insure that future silviculture objectives are clear and can be met.

- In the DEIS On page 262 - table 55, Inplan model, will need to be rerun to adjust for volume and acre errors associated with the data to be corrected in table 53 from jobs of 407 figure corrected to 600+ jobs.

- The NKRD has about 501,000 acres and of this total about 250,000 acres of productive timber lands and NKRD grows about 200 BF/acre per year that calculates to about 50 million board feet per year of annual growth and is added annually to future levels that should raise questions about growth versus removals in the draft plan and DEIS.

- Assuming the NKRD will grow at least 50 million board feet per year and only harvest 22 million board feet per year, a difference of roughly 30 million board feet per year is being added to the existing forest of some 2 billion board feet of standing inventory. This indicates that it will be challenging to in a timely fashion restore historic fire adapted forested ecosystems during this century, much less during the next 10 to 15 years unless steps are taken in this planning period to correct these faulty assumptions.

- Finally in reference in the draft plan and EIS to cork-bark fir on the NKRD is in error on the NKRD in the wet mixed conifer we have alpine fir in abundance.

Thank you for the opportunity to comment.

Sincerely,

James Matson

Digitally signed by James Matson
DN: cn=James Matson, o, ou, email=jmatson@kanab.net, c=US
Date: 2012.07.17 22:31:55 -06'00'

James L. Matson
Chair, Kane County Board of Commissioner

United States Department of the Interior
OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
Pacific Southwest Region
333 Bush Street, Suite 515
San Francisco, CA 94104

IN REPLY REFER TO:
ER# 12/0286

Electronically Filed

17 July 2012

Ms. Ariel Leonard, Forest Planner
U.S. Forest Service
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Subject: Notice of Availability of a Draft Environmental Impact Statement, U.S. Forest Service, Kaibab National Forest Land and Resource Management Plan Implementation, Coconino, Yavapai, and Mojave Counties, AZ

Dear Ms. Leonard:

The Department of the Interior has reviewed the U.S. Forest Service's (USFS) April 2012 Draft Land and Resource Management Plan for the Kaibab National Forest (draft LRMP) and the April 2012 Draft Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan (DEIS). We offer the following comments on the draft LRMP and DEIS.

Comments on the draft LRMP

On July 9, 2010, U.S. Fish and Wildlife Service (FWS) reviewed the March 2010 working draft of the LRMP and provided extensive general and technical comments to Kaibab National Forest (Kaibab NF). We reviewed the 2012 draft LRMP, and it appears to be very similar to the working draft that was reviewed in 2010.

Most of the comments and recommendations FWS provided in 2010 do not appear to have been incorporated into the draft LRMP. In addition to the comments below, we refer Kaibab NF to comments provided in 2010, which are also relevant to parallel sections in the DEIS. We are prepared to discuss those comments and recommendations with Kaibab NF.

1

California Condor

Ingestion of lead and subsequent poisoning of condors remains the primary source of mortality in the Southwest condor population. We appreciate Kaibab NF's support of recovery efforts for this population through participation in the Southwest Condor Working Group. Although Arizona Game and Fish Department's (AGFD) voluntary non-lead program has a high hunter participation rate, contrary to the overall message presented in the draft LRMP regarding condor viability, there has not been a corresponding decrease in blood lead levels or mortality of condors due to lead poisoning.

Condors are still at risk in the experimental population area due primarily to exposure to lead ammunition from sources that may occur throughout their southwestern range.

Please also see the comment regarding condor conservation measures on page 90 of the DEIS in the DEIS comments section below.

Mexican Spotted Owl

Ponderosa pine-Gambel oak and mixed conifer forests provide habitat for the Mexican spotted owl on the Kaibab NF. Although we support Kaibab NF's efforts to manage for sustainable forest structure in both forest types, it is unclear from descriptions provided in the draft LRMP how desired conditions would provide for nesting/roosting habitat for Mexican spotted owls.

For example, the fine-scale desired conditions for ponderosa pine state, "Where historically occurring, there are oak thickets with various diameter stems, and low growing, shrubby oak. These thickets provide forage, cover, and habitat for species that depend on them such as small mammals, foliage nesting birds, deer, and elk. Large oak snags and partial snags with hollow boles or limbs are present."

As written, the desired condition implies oak locations are static. We encourage Kaibab NF to manage for Gambel oak, not only where it occurred historically, but also where it may grow within its natural range on the Williams Ranger District. Gambel oak may respond positively to low-intensity surface fire and could increase in areas through fire management.

In addition, although we know tree-form Gambel oak is less common in this area, it does occur, and not just as snags or partial snags. Therefore, we recommend modifying the desired condition to include the desire for larger, tree-form oaks.

Mixed conifer forests tend to occur along a precipitation and elevation continuum. Although the draft LRMP acknowledges this continuum, it combines all mixed conifer into a category of frequent fire mixed conifer. We recommend the draft LRMP provide more information regarding how mesic mixed conifer forest will be maintained. It appears the intention of the LRMP is to manage most mixed conifer forest on the Kaibab NF in a more open, ponderosa pine-dominated condition.

Chapter 5, Table 5 includes the monitoring question "Are Mexican spotted owls present in PACs?" Mexican spotted owl home ranges include areas beyond the designated PACs, and habitat within PACs changes over time. We recommend asking the question "Do Mexican spotted owls occupy potential nest/roost habitat?" Although PACs may be the unit of measure, they will likely change over time and surveys should cover the best available habitat.

The draft LRMP acknowledges management of Mexican spotted owl habitat in pine-oak and mixed conifer forests, per the Recovery Plan. However, we recommend including more specific guidelines for management and protection of Mexican spotted owls and other listed species on the Kaibab NF, under the "Guidelines of Wildlife Management" and within desired condition objectives, in order to incorporate section 7(a)(1) recovery responsibilities.

We would like to continue to work with the Kaibab NF on the management approach to both ponderosa pine and mixed conifer forest to more specifically identify objectives for the Mexican spotted owl within the LRMP and to meet recovery objectives for this species on the Kaibab NF.

Apache Trout

We recommend designing any timber harvest, thinning, or fire treatments in the watershed(s) supporting North Canyon Creek in a manner that enhances and protects Apache trout habitat. In the watersheds that include and drain into North Canyon Creek, we recommend designing fire treatments in a manner that will result in low intensity surface fire with minimal torching. Because of heavier fuel loads in this area, it may take more initial entries to meet fuels objectives. We do not recommend conducting vegetation manipulation via wildfire management in these watershed(s) due to potential for degrading Apache trout habitat in North Canyon Creek.

Kaibab Plains Cactus

We recommend including a clear statement in the draft LRMP to fully incorporate, integrate, and implement the October 1996 *Paradine Plains Cactus (Pediocactus paradinei B.W. Benson) Conservation Assessment and Strategy on the North Kaibab Ranger District, Kaibab National Forest and Arizona Strip District, Bureau of Land Management*. This should also be incorporated into the "Guidelines for the Pediocactus Conservation Area."

Arizona Bugbane

Similar to our recommendation above, we recommend including a clear statement in the draft LRMP to fully incorporate, integrate, and implement the May 1995 *Arizona bugbane (Cimicifuga arizonica) Conservation Assessment and Strategy, Coconino and Kaibab National Forests*. Commitment to the conservation strategy should also be included in the "Guidelines for the Arizona Bugbane Botanical Area."

3

Comments on the DEIS

Page 8, Lead Ammunition

The paragraph states under all plan alternatives, the viability of the California condor would be maintained. Table 15 (page 79) identifies the viability risk as "low."

FWS recently completed the third five-year review of the Southwest California condor recovery program. The review concluded exposure to lead contamination continues to affect both individual birds and the population, and further efforts to reduce the lead load available to scavenging birds are crucial for program success. Due primarily to issues from exposure to lead ammunition, the population is currently maintained through release of captive-bred birds, and is not likely to become self-sustaining unless further lead reduction efforts are taken.

Page 19, Table 1

The DEIS states objectives to protect 10 springs in five years, and restore native vegetation and water flow patterns on six acres of wetlands in five years to benefit species by improving water availability and habitat conditions for migratory birds and aquatic/riparian dependent species. We encourage the Kaibab NF to continue to inventory such waters to determine if other locations are suitable for additional protection or restoration.

Page 24-25, Vegetation Affected Environment

The general cover types reported here do not match the cover types addressed later in the DEIS. We recommend identifying the cover types discussed within the draft LRMP, by categorizing them within the general cover types. We also recommend Mexican spotted owl habitat (pine-oak and mixed conifer), as defined in the Mexican spotted owl Recovery Plan, be identified and addressed in the DEIS, since the draft LRMP indicates the Recovery Plan will be followed.

Page 36, Wildfire Management

The discussion includes a description of a wildland fire use amendment to the LRMP in 2000, which requires suppression in the mixed conifer cover type on the North Kaibab Ranger District. As offered in the past, FWS would like to discuss with the Kaibab NF on how to manage fires in mixed conifer owl habitat to protect these habitats from high intensity fire while meeting other restoration goals.

The DEIS states current fire management requires suppressing all wildfire starts within a two-mile radius of North Canyon Spring, Frank's Lake Geologic-Botanic Area, and the Arizona Bugbane Area. We recommend future management in these areas and in the Kaibab Plains Cactus Conservation Area only be for low-intensity surface fires if possible, or fires be suppressed if conditions lead to higher intensity fire.

Page 37, Alternative B Objectives

The overall objective is to reduce forests to reference conditions, decrease tree density, and increase openness. Although the draft LRMP states the Mexican spotted owl recovery plan would be followed, we recommend restating this as an objective for each alternative. Otherwise, it is unclear where or how obtaining the objectives listed here would be applied in Mexican spotted owl habitat (pine-oak and mixed conifer) in order to avoid degradation and type conversion of the habitat.

Pages 66-68, Habitat Elements

There are important Mexican spotted owl habitat element categories missing in the list: large trees, tree density (basal area or number of trees) associated with particular tree size classes, large logs, hardwoods, canopy cover, species composition, and residual plant cover.

Because these elements are closely tied to Mexican spotted owl habitat and management recommendations in the Recovery Plan, and management per the Recovery Plan is called for in the draft LRMP, we recommend addressing these elements in this section, or more specifically referencing their management per the Recovery Plan.

Page 79, Habitat Elements

The habitat elements listed under this column heading are confusing because they mix forest/vegetation types with the habitat elements described on pages 66-68. We recommend either deleting the vegetation types from this table or specifically identifying the important aspects of habitat these types provide to various species listed. For example, other important aspects of habitat for the Mexican spotted owl, not described on pages 66-68, include particular tree size classes, large logs; hardwoods, canopy cover, species composition, and residual plant cover (see comment above).

Page 79, Viability Risk

For the Mexican spotted owl, the stated viability risks range from moderate to high across the various alternatives. However, the draft LRMP states the management approach for these cover types would include protection of Mexican spotted owl habitat per the Recovery Plan. It is unclear how the viability risks were assigned and how management under each alternative would implement the Recovery Plan, reduce risk, and maintain key habitat components of Mexican spotted owl habitat.

Page 85, Other Law and Policy

The draft LRMP and DEIS refer to "other law and policy" in various locations and contexts, but include very little discussion. For example, we infer the meaning of the sentence, "The species status highlights the relative role of other provisions included in law and policy that result in additional consideration of at-risk species during planning" means because these species are rare and are protected by various laws (such as the Endangered Species Act and/or USFS policies),

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their habitat needs would be specifically addressed and accounted for during the course of project planning.

Therefore, we recommend references to other law and policy more clearly describe how they would be implemented in the context of LRMP desired conditions and objectives.

Page 89, Spikedace and Loach Minnow

We recommend if forest management practices or other activities managed by the Kaibab NF may affect habitat for spikedace or loach minnow, a brief description of these types of activities and potential effects be provided.

Page 90, Condor Mitigation Measures

The short list of California condor conservation measures includes those appropriate for many forest projects. However, the list does not include other measures to minimize adverse effects for other projects. We recommend the Kaibab NF continue to work with us to tailor condor conservation measures to projects as appropriate.

Page 93, Status of Condors

The paragraph states condors outside of the 10(j) population area are considered a federally-listed endangered species. To clarify this statement, the California condor is federally listed as an endangered species under the ESA. Only for purposes of section 7 consultation are these condors treated as a proposed species when within the 10(j) population area.

Page 93, Primary Threats to Condors

Within the Southwest population, only one condor has been confirmed killed due to collision with a powerline. However, the primary factor affecting this population is lead poisoning. Without further range-wide efforts to reduce the effects of lead exposure, we believe it is unlikely this population can become self-sustaining.

Although collision with powerlines is not a primary threat to condors, we recommend using current recommendations by Avian Powerline Interaction Committee for the construction of new utility lines and/or retrofitting existing lines found at: http://www.aplic.org/mission.php. These recommendations could also provide significant benefits to other raptor species.

Page 125, Condor Nesting

The successful nesting attempt on the Kaibab NF occurred in 2011. An unsuccessful attempt occurred in 2010.

Page 126, Condors and Lead

Although condors do use Kaibab NF for dispersal habitat and foraging on road-killed ungulates, much of the use of the Kaibab Plateau occurs during the hunting season to feed on carrion left by hunters and winter-killed deer. AGFD's voluntary non-lead program has reported high rates of hunter participation, but without reducing lead exposure throughout the condors' range in the Southwest; it is unclear how effective the AGFD's measures can be in reducing the need for continued treatment for lead poisoning, or in reducing condor mortality from lead.

Pages 132 and 135, Table 21

The stated viability risks for Arizona bugbane and Paradine plains cactus under all alternatives are moderately high to high. Those risks underscore the importance of full compliance with and implementation of the conservation agreement and strategies for these species.

Page 142, Bill Williams Mountain Management Area

The DEIS states, "The establishment of the Bill Williams Mountain Management Area under Alternative B would provide guidance over a wider area surrounding the Arizona Bugbane Botanical Area by establishing desired conditions that include providing quality habitat for Arizona bugbane." We recommend the DEIS elaborate on the guidelines or desired conditions, and how these correspond with the conservation agreement and strategy for the species.

Page 145, Last Paragraph

Because the Fickeisen plains cactus is a candidate species, it is not currently protected by the ESA; however, it is currently being considered for Federal listing.

Page 313, Table B-16

Although the category is not broken down into the sub-categories of mixed conifer presented in the draft LRMP, the table indicates there are currently 35,123 acres of mixed conifer (Mexican spotted owl habitat) on the Kaibab NF. The table also indicates Alternatives B (34,484 acres), C (28,089), and D (25,544) would result in a decrease of mixed conifer. We recommend including information indicating how management under each of these alternatives would continue to meet Recovery Plan goals and objectives for the Mexican spotted owl.

Page 315, Table B-20

Although the table refers to ponderosa pine, one category in the table is "MSO habitat," which we assume is for the pine-oak cover type. The table indicates there are currently 20,443 acres of pine-oak on the Kaibab NF and this acreage would change under each alternative. Under Alternative B, the acreage of pine-oak would increase to 22,714 acres. However, neither the table nor the text of the DEIS indicate where this increase would come from.

We do not recommend converting the mixed conifer cover type to pine-oak, if this is where the change would occur. The amount of pine-oak in Alternatives C and D would decrease to 18,929 and 18,171 acres, respectively. We do not recommend converting pine-oak to ponderosa pine, if this is where the change would occur.

We recommend including a discussion in the DEIS describing whether or how type conversions would occur and the effects of such conversions on listed species.

We are available to discuss these comments with the Kaibab NF and further develop means to incorporate guidance from recovery plans and conservation agreements and strategies into the LRMP. We appreciate this opportunity to provide comments on the draft LRMP and DEIS, and we look forward to continuing our work with USFS.

Thank you for the opportunity to review and comment on the LRMP and DEIS. If you have any questions, or require further assistance, please contact Steve Spangle, Field Supervisor, Arizona Ecological Services Field Office, Phoenix, Arizona, at 602-242-0212.

Sincerely,

Patricia Sanderson Port

Patricia Sanderson Port
Regional Environmental Officer

Cc:
Director, OEPC
Staff Contact, OEPC
Regional Director, FWS/AZ

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

JUL 18 2012

Ms. Ariel Leonard
Forest Planner
Attn: Forest Plan Revision Team
Kaibab National Forest
800 South 6th Street
Williams, Arizona 86046

Subject: Draft Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan, Coconino, Yavapai, and Mojave Counties, Arizona (CEQ# 20120111)

Dear Ms. Leonard:

The U.S. Environmental Protection Agency has reviewed the Draft Environmental Impact Statement for the Kaibab National Forest Land and Resource Management Plan pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

The EPA commends the Forest Service for the commitment to restoration and adaptive management demonstrated in the Kaibab Land and Resource Management Plan. Implementing the four broad goals identified in the plan revision—to modify stand structure and restore historic fire regimes; protect and regenerate aspen; protect natural waters; and restore grasslands—will be crucial to restoring the Kaibab National Forest to desired conditions. We also strongly support the ongoing collaboration between the Kaibab, Coconino, and Apache-Sitgreaves National Forests to sustainably manage Arizona's federal ponderosa pine and mixed conifer forests, both through revisions of your respective land management plans, as well as through the Four Forest Restoration Initiative, the landscape-scale planning effort to restore 2.4 million acres of forest lands in northern Arizona.

Based on our review of the DEIS, we have rated the preferred alternative and the document as LO-1, Lack of Objections – Adequate (see enclosed EPA Rating Definitions). The EPA recognizes the need for the use of mechanical thinning and prescribed fire and wildfire to achieve long-term restoration objectives. We commend the Forest Service for committing, in the preferred alternative, to strong best management practices and soil and water conservation practices to protect sensitive resources during mechanical harvest and fire treatments. We would also like to acknowledge the thorough description, in the DEIS, of the possible effects of climate change on the Kaibab National Forest, and the commitment, through the preferred alternative, to mitigate those effects.

We recognize the challenge the Forest Service faces by implementing a management plan that will rely heavily on prescribed burns and wildfire to achieve restoration objectives. We commend the Forest Service for preparing an "Air Quality Specialist Report" for this plan that explains these challenges. Though the planning area has good air quality, and meets all federal ambient air quality standards, the fine particulate matter generated during wildland fire does present a human health risk. We recommend that the Forest Service implement BMPs and work with the interagency Smoke Management Group to reduce emissions from prescribed burns and wildfires to the greatest possible extent.

We appreciate the opportunity to review this DEIS, and are available to discuss our comments. When the FEIS is released for public review, please send one hard copy and one CD-ROM to the address above (Mail Code: CED-2). If you have any questions, please contact me at 415-972-3521, or contact Jason Gerdes, the lead reviewer for this project. Jason can be reached at 415-947-4221 or gerdes.jason@epa.gov.

Sincerely,

Kathleen Martyn Goforth, Manager
Environmental Review Office

Enclosure: Summary of the EPA Rating System

SUMMARY OF EPA RATING DEFINITIONS*

This rating system was developed as a means to summarize the U.S. Environmental Protection Agency's (EPA) level of concern with a proposed action. The ratings are a combination of alphabetical categories for evaluation of the environmental impacts of the proposal and numerical categories for evaluation of the adequacy of the Environmental Impact Statement (EIS).

ENVIRONMENTAL IMPACT OF THE ACTION

"LO" (Lack of Objections)

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

"EC" (Environmental Concerns)

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

"EO" (Environmental Objections)

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

"EU" (Environmentally Unsatisfactory)

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

ADEQUACY OF THE IMPACT STATEMENT

"Category 1" (Adequate)

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

"Category 2" (Insufficient Information)

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analysed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

"Category 3" (Inadequate)

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analysed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640, Policy and Procedures for the Review of Federal Actions Impacting the Environment.